EMOTION REGULATION IN EDUCATIONAL CONTEXTS: THE ROLE OF POSITIVE STRATEGIES AND SELF-CONTROL

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Summary

In situations related to academic learning and achievement, individuals experience a variety of positive and negative emotions. Since negative emotions are known to have detrimental effects on learning and achievement, effective regulation of negative emotions is thought to benefit academic learning and success. To date, research has hardly examined which emotion regulation strategies are more or less beneficial in educational contexts and what the responsible mechanisms are. Based on evidence that positive emotions are able to replenish an individual's self-control capacity (counteracting 'ego depletion'), this thesis examined whether positive emotion regulation benefits academic learning and performance via promoting self-control resources. The main purpose was to examine whether the emotion regulation strategy of positive reappraisal benefits emotion experience and physiology as well as self-control resources in learning and achievement situations, as compared with strategies that focus on a mere reduction of negative emotions. Further objectives were to understand the role of positive emotions for self-control capacity and whether higher self-control resulting from emotion regulation is able to promote self-regulated learning and working memory capacity. A last purpose of this research was to test the effectiveness of an intervention to foster self-regulated learning that integrates positive emotion regulation.

Two experimental studies and one intervention study examined the outcomes and trainability of positive emotion regulation in the context of academic learning and achievement. The first experimental study (manuscript A) compared the two strategies positive reappraisal and expressive suppression, whereas the second experiment (manuscript B) searched for within-strategy differences by comparing positive reappraisal with reappraisal focused on decreasing negative emotions. In the intervention study (manuscript C), a training program was developed that aimed at promoting a range of positive emotion regulation strategies tailored to the context of academic learning for secondary school students. The effectiveness of an integrated training program that fostered both positive emotion regulation and self-regulated learning strategies simultaneously was compared with pure emotion regulation training.

Part 1 of this dissertation features a synopsis. It provides a theoretical introduction leading to the research objectives, followed by an overview of the three manuscripts and a summarizing discussion.

Part 2 includes the three original manuscripts. The first experimental study that

compared positive reappraisal with expressive suppression (manuscript A) is followed by the second experimental study that compared positive reappraisal with reappraisal that reduces negative emotions (manuscript B). Finally, the intervention study is presented (manuscript C).

In manuscript A, it was examined whether positive reappraisal promotes self-regulated learning by counterbalancing the depletion of self-control resources. Sixty-one university students used either positive reappraisal or expressive suppression to regulate negative emotions that were induced by a film clip on animal testing or were asked to not regulate their emotions (control group). They subsequently worked on a self-regulated learning task which involved gaining knowledge on the island of Malta. Participants who had used positive reappraisal experienced more positive emotions after the film and reported a higher availability of self-control resources than participants in the expressive suppression group. As compared to expressive suppression and no regulation, engaging in positive reappraisal also led to a continued increase in skin conductance during emotion regulation. Regardless of the emotion regulation strategy, experiencing positive emotions best predicted post-film availability of self-control resources. Post-film self-control was positively linked with subsequent self-regulated learning. The beneficial affective and resource-related implications of positive reappraisal highlight its potential for fostering self-regulated learning.

In manuscript B, positive reappraisal was contrasted with reappraisal that focuses on decreasing negative emotions regarding the consequences for affect, self-control, and working memory capacity. Participants (N = 118) either used one of these reappraisal tactics to regulate negative emotions elicited by failure feedback on their performance in a previous test, or received no feedback/no tactic instruction (control groups). In contrast to reappraisal aimed at reducing negative emotions, positive reappraisal allowed participants to effectively regain positive affect. Performance in a subsequent working memory test (operation span task) was affected by both self-control capacity and affective state, when participants had engaged in positive reappraisal. In reappraisers who aimed at reducing negative emotions, however, self-control capacity promoted working memory performance independent of affect. Across three assessments before and after emotion regulation as well as after the working memory test, positive affect was associated with higher self-control capacity. The results demonstrate affective advantages of positive reappraisal over reappraisal reducing negative emotions. However, depending on the individual self-control level, both tactics may facilitate or harm cognitive performance and may thereby affect

academic success.

In manuscript C, an integrated training program that fosters both self-regulated learning and positive emotion regulation in learning situations was compared to an emotion regulation-only and a control program (cognitive techniques-only). Eight groups of secondary school students (total $N = 106$) attending 8th – 10th grade took part in one of the programs, each involving three 90-minute sessions in weekly intervals. The deployment of emotion regulation and self-regulated learning strategies as well as participants' self-control capacity were assessed before and after the intervention. The integrated program increased the use of positive emotion regulation, effectively promoted the use of all trained strategies of self-regulated learning, and tended to increase self-control capacity. The emotion regulation-only program was less effective in fostering emotion regulation and self-control capacity but selectively supported strategies of self-regulated learning deployed before learning. The findings demonstrate the superiority of an integrated approach to fostering positive academic emotion regulation in programs of self-regulated learning.

Summing up, the findings of this dissertation shed light on the consequences of positive reappraisal in educational contexts. They demonstrate a positive impact on affect and self-control resources, which in turn were supportive of self-regulated learning and facilitated cognitive performance. Training of positive emotion regulation made a valuable contribution to programs that foster self-regulated learning in secondary school students. Based on the findings, enhancing positive emotion regulation should be considered an important component in fostering self-regulation and academic success.

Zusammenfassung

In akademischen Lern- und Leistungssituationen werden verschiedene sowohl positive als auch negative Emotionen erlebt. Da sich für negative Emotionen ungünstige Effekte auf Lernen und Leistung gezeigt haben, wird angenommen, dass eine effektive Regulation negativer Emotionen sich vorteilhaft auf akademisches Lernen und akademischen Erfolg auswirkt. Bislang ist wenig erforscht, welche Emotionsregulationsstrategien in Bildungskontexten günstige oder ungünstige Effekte haben und welche Mechanismen dem zugrunde liegen. Basierend auf Studien, die zeigen, dass positive Emotionen in der Lage sind die Selbstkontrollkapazität wiederherzustellen (d. h. einer Selbstkontrollerschöpfung entgegenzuwirken), untersucht diese Arbeit, ob positive Emotionsregulation sich mittels der Förderung von Selbstkontrollressourcen vorteilhaft auf akademisches Lernen und Leisten auswirkt. Hauptziel war es zu prüfen, ob die Emotionsregulationsstrategie ‚positive Umbewertung' im Vergleich zu Strategien, die nur auf die Reduktion negativer Emotionen abzielen, förderlicher ist – sowohl für das emotionale Erleben und damit verbundene physiologische Zustände als auch im Hinblick auf die Selbstkontrollressourcen in Lern- und Leistungssituationen. Weitere Ziele waren, die Rolle positiver Emotionen für die Selbstkontrollkapazität zu untersuchen, sowie zu prüfen, ob aus der Emotionsregulation resultierende höhere Selbstkontrollressourcen in der Lage sind das Selbstreguliertes Lernen und die Arbeitsgedächtniskapazität zu unterstützen. Schließlich sollte die Wirksamkeit einer Intervention zur Förderung des Selbstregulierten Lernens geprüft werden, welche positive Emotionsregulation integrierte.

In zwei experimentellen Studien und einer Interventionsstudie wurden die Wirkungen und die Trainierbarkeit positiver Emotionsregulation im Kontext akademischen Lernens und Leistens untersucht. Die erste experimentelle Studie (Manuskript A) verglich die beiden Strategien positive Umbewertung und Unterdrückung des Emotionsausdrucks, während das zweite Experiment (Manuskript B) Binnenstrategie-Unterschiede untersuchte, indem positive Umbewertung verglichen wurde mit Umbewertung, die auf die Verringerung negativer Emotionen fokussiert. In der Interventionsstudie (Manuskript C) wurde ein Trainingsprogramm entwickelt, das die Förderung verschiedener positiver Emotionsregulationsstrategien zum Ziel hatte, und auf den schulischen Lernkontext von

Mittelstufenschülerinnen und –schülern zugeschnitten war. Die Wirksamkeit eines integrierten Trainingsprogramms, das sowohl positive Emotionsregulation als auch das Selbstregulierte Lernen förderte, wurde verglichen mit einem reinem Emotionsregulationstraining.

Teil 1 dieser Dissertation beinhaltet eine Synopse. Sie enthält eine theoretische Einführung, welche in die Darstellung der Forschungsziele mündet, gefolgt von einem Überblick über die drei Manuskripte und einer zusammenfassenden Diskussion.

Teil 2 umfasst die drei Originalmanuskripte. Die erste experimentelle Studie, welche positive Umbewertung mit Unterdrückung des Emotionsausdrucks verglich (Manuskript A), wird gefolgt von der zweiten experimentellen Studie, welche positive Umbewertung und Umbewertung mit dem Ziel der Verringerung negativer Emotionen verglich (Manuskript B). Schließlich wird die Interventionsstudie dargestellt (Manuskript C).

In Manuskript A wurde untersucht, ob positive Umbewertung das Selbstregulierte Lernen fördert, indem es der Erschöpfung von Selbstkontrollressourcen entgegenwirkt. Einundsechzig Universitätsstudierende verwendeten entweder die Strategie positive Umbewertung oder Unterdrückung des Emotionsausdrucks um negative Emotionen zu regulieren, die mittels eines Films über Tierversuche induziert wurden. Die Kontrollgruppe wurde gebeten, ihre Emotionen nicht zu regulieren. Anschließend bearbeiteten die Versuchspersonen eine Aufgabe, die Selbstreguliertes Lernen erforderte und welche darin bestand, sich Wissen über die Insel Malta anzueignen. Versuchspersonen, die positive Umbewertung eingesetzt hatten, erlebten mehr positive Emotionen nach dem Film und berichteten eine höhere Verfügbarkeit von Selbstkontrollressourcen als Versuchspersonen in der Unterdrückungsgruppe. Verglichen mit Unterdrückung und Nicht-Regulation führte die Nutzung von positiver Umbewertung zudem zu einem fortgesetzten Anstieg der Hautleitfähigkeit während der Emotionsregulation. Unabhängig von der verwendeten Emotionsregulationsstrategie wurde die Verfügbarkeit von Selbstkontrollressourcen nach dem Film durch die erlebten positiven Emotionen vorhergesagt. Selbstkontrolle nach dem Film war zudem positiv verknüpft mit anschließendem Selbstreguliertem Lernen. Die Ergebnisse zu günstigen affektiven und ressourcenbezogenen Wirkungen positiver Umbewertung unterstreichen das Potenzial dieser Emotionsregulationsstrategie im Rahmen der Förderung des Selbstregulierten Lernens.

In Manuskript B wurde positive Umbewertung verglichen mit Umbewertung, die auf die Verringerung negativer Emotionen fokussiert. Der Vergleich erfolgte hinsichtlich der Auswirkungen auf Affekt, Selbstkontrolle und die Arbeitsgedächtniskapazität. Die

Versuchspersonen (N = 118) nutzten entweder eine der beiden Umbewertungstaktiken um negative Emotionen zu regulieren, die durch ein Misserfolgs-Feedback zu ihrer Leistung in einem vorangegangenen Test hervorgerufen wurden, oder sie erhielten kein Feedback/ keine Taktikinstruktion (Kontrollgruppen). Im Gegensatz zu Umbewertung mit dem Ziel der Verringerung negativer Emotionen ermöglichte positive Umbewertung den Versuchspersonen die wirksame Wiederherstellung positiven Affekts. Wenn die Versuchspersonen zuvor positive Umbewertung eingesetzt hatten, wurde die Leistung in einem anschließenden Arbeitsgedächstnistest (operation span-Aufgabe) sowohl von der Selbstkontrollkapazität als auch vom emotionalen Zustand beeinflusst. Nach Einsatz von Umbewertung mit dem Ziel der Reduktion negativer Emotionen förderte die Selbstkontrollkapazität die Arbeitsgedächtniskapazität hingegen unabhängig vom Affekt. Über drei Messzeitpunkte hinweg, d. h. vor und nach der Emotionsregulation als auch nach dem Arbeitsgedächtnistest, war positiver Affekt mit höherer Selbstkontrollkapazität assoziiert. Die Ergebnisse demonstrieren affektive Vorteile von positiver Umbewertung gegenüber der Umbewertung zur Verringerung negativer Emotionen. Abhängig vom individuellen Selbstkontrollniveau können jedoch beide Taktiken die kognitive Leistung fördern oder beeinträchtigen und damit akademischen Erfolg beeinflussen.

In Manuskript C wurde ein integriertes Trainingsprogramm zur Förderung Selbstregulierten Lernens und positiver Emotionsregulation in Lernsituationen verglichen mit einem reinen Training zur positiven Emotionsregulation in Lernsituationen sowie mit einem Kontrolltraining (ausschließlich kognitive Techniken). Acht Gruppen von Mittelstufenschülerinnen und –schülern (N_{gesamt} = 106), welche die 8. bis 10. Klasse besuchten, nahmen an einem der Trainingsprogramme teil, welche jeweils drei 90-minütige Einheiten im wöchentlichen Abstand umfassten. Der Einsatz von Strategien zur Emotionsregulation und zum Selbstregulierten Lernen sowie die Selbstkontrollkapazität der Teilnehmenden wurde vor und nach der Intervention erfasst. Das integrierte Training steigerte den Einsatz positiver Emotionsregulation, förderte wirksam alle trainierten Strategien des Selbstregulierten Lernens und führte zu einer leichten Erhöhung der Selbstkontrollkapazität. Das reine Emotionsregulationstraining war weniger effektiv in der Förderung von Emotionsregulation und Selbstreguliertem Lernen, unterstützte aber selektiv solche Strategien des Selbstregulierten Lernens, die vor dem Lernen eingesetzt werden. Die Befunde demonstrieren die Überlegenheit eines integrierten Ansatzes zur Förderung positiver akademischer Emotionsregulation im Rahmen von Trainingsprogrammen zum Selbstregulierten Lernen.

Zusammengefasst beleuchten die Ergebnisse dieser Dissertation die Auswirkungen von positiver Umbewertung in Bildungskontexten. Sie zeigen eine positive Wirkung auf Affekt und Selbstkontrollressourcen, welche wiederum das Selbstregulierte Lernen sowie die kognitive Leistung förderten. Das Training positiver Emotionsregulation leistete einen wertvollen Beitrag zu Programmen zur Förderung des Selbstregulierten Lernens für Mittelstufenschülerinnen und –schüler. Die Ergebnisse sprechen dafür, die Förderung positiver Emotionsregulation als wichtige Komponente der Förderung von Selbstregulation und akademischem Erfolg zu betrachten.

List of Original Manuscripts

This doctoral thesis is based on three original articles. One manuscript is published and two manuscripts are under review/revision for journals listed in the Social Science Citation Index (SSCI).

I. PART 1: SYNOPSIS

1. Theoretical Background

1.1. The role of academic emotions and their regulation in (self-regulated) learning an achievement

In situations related to academic learning and achievement students may experience a variety of emotions including positive and negative emotions (e.g., enjoyment of learning, shame for failure), task- and self-related (e.g., joy about success, anxiety), and social emotions (e.g., admiration, envy) (Pekrun, Frenzel, Goetz, & Perry, 2007). These 'academic emotions' have been found to affect academic success. Positive emotions enhanced motivation, cognitive resources, the use of learning strategies, and overall academic achievement, whereas detrimental effects were observed with negative emotions (Pekrun, Goetz, Titz, & Perry, 2002a). Therefore, effective regulation of negative emotions is thought to benefit academic learning and success by promoting motivation, cognition, and learning.

Emotion regulation refers to influencing which emotions individuals experience and when, as well as how these emotions are experienced and expressed in behavior (Gross, 1998b, 2015). Regulation strategies may target different parts of the emotion-generative process and are accordingly categorized into five sets: 'Situation selection' refers to approaching or avoiding a situation, 'situation modification' means to change aspects of a situation, 'attentional deployment' involves directing attention towards or away from such situational aspects, 'cognitive change' refers to altering the evaluation of a situation, and 'response modulation' involves changing the intensity of the experience, behavioral expression, or physiological response associated with an emotion. Emotion regulation strategies are also assigned to either antecedent-focused (all strategies but response modulation) or response-focused strategies. Antecedent-focused strategies operate early in the emotion generative process and are thought to be more effective than response-focused strategies that operate after the emotional response tendency has been fully activated.

With their substantial influence on learning and achievement, emotions play an important role in concepts of self-regulated learning (e.g., Zimmerman, 2000). Self-regulated learning refers to the process of adaptive goal pursuit in which learners set

individual goals that they pursue via monitoring their progress and regulating their cognition, motivation, and behavior (Pintrich, 2000). The process-model of self-regulated learning by Schmitz and Wiese (2006) particularly stresses the importance of emotions in the self-regulated learning process which includes situational demands, affective, motivational (e.g., self-efficacy), metacognitive (e.g., monitoring), and behavioural aspects (e.g., learning outcome). Three phases of the learning process are distinguished (preaction, action, and postaction; cf., Heckhausen & Kuhl, 1985): Six components are included in the preaction phase (situation, task, affect, goals, motivation, self-efficacy), four components in the action phase (self-monitoring, (meta-) cognitive and resource-management strategies, volitional strategies, learning time), and five in the postaction phase (self-reflection, quality and quantity of learning outcome, satisfaction with outcome, affect). Evaluations made in the postaction phase are thought to serve as a basis for adapting goals and strategies with regard to subsequent learning (regulation). While Schmitz and Wiese assign affective influences to the preaction and postaction phase (e.g., hope for/pride of success), research on academic emotions indicates that emotions affect learning at all stages, also in the action phase (e.g., boredom and enjoyment during learning) (cf., Pekrun et al., 2002). Thus, emotion regulation should be considered as important for (self-regulated) learning as cognitive or behavioral regulation forms (cf., Ben-Eliyahu & Linnenbrink-Garcia, 2013).

1.2. Positive emotion regulation: Increasing positive emotions to conserve self-control capacity

Models of self-control (e.g., Baumeister & Heatherton, 1996; Inzlicht & Schmeichel, 2012) contribute to assessing which emotion regulation strategies are more or less beneficial in educational contexts. Self-control refers to a limited capacity to change one's responses so as to adjust them to standards, and to promote the pursuit of long-term goals (Baumeister, Vohs, & Tice, 2007; Inzlicht & Schmeichel, 2012). It is thought to be a deliberate, conscious, and effortful subset of self-regulation, required across various domains such as controlling attention, emotions, or impulses as well as choice, cognitive and social processing (e.g., Baumeister et al., 2007). Self-control has been shown to be relevant to many desirable outcomes including academic success and well-being (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012). Deliberate emotion regulation as well as (self-regulated) learning and cognitive performance can be assumed to rely on that basic capacity. According self-control theory, different kinds of self-regulatory acts are thought

to draw on and compete for the limited capacity of self-control (for a review, see Hagger, Wood, Stiff, & Chatzisarantis, 2010). Any self-regulatory effort is assumed to deplete self-control capacity and to cause a state of reduced capacity for concurrent or consecutive self-control efforts ('ego depletion'). Regulating emotions may thus reduce self-control resources to an extent that may harm subsequent self-regulated learning (c.f., Ben-Eliyahu & Linnenbrink-Garcia, 2015) or impair cognitive processing (e.g., Schmeichel, Vohs, & Baumeister, 2003). However, there is evidence that positive emotions are able to replenish self-control capacity, thus counteracting ego depletion (Tice, Baumeister, Shmueli, & Muraven, 2007): Positive affect induced by surprise gifts or humorous videos was able to restore performance (e.g., persistence on unsolvable puzzles or change in handgrip physical stamina) after initial self-control depletion. Based on Tice et al.'s (2007) findings it seems promising to examine whether positive emotions that result from emotion regulation instead of emotion induction are also able to promote self-control resources: Emotion regulation strategies that increase positive emotions may consume less self-control resources than strategies that focus solely on reducing negative emotion and may consequently benefit (self-regulated) learning and cognitive performance. Moreover, since positive emotions were shown to promote learning and achievement (Pekrun et al., 2007), emotion regulation strategies that enhance positive emotions should also be particularly favorable in the context of academic learning and achievement.

1.3. Effects of positive reappraisal on emotion experience and physiology

Two emotion regulation strategies received a great deal of attention in the scholarly literature, cognitive reappraisal, i.e., changing one's interpretation in a way that modifies the emotional response, and expressive suppression, which involves decreasing emotion-expressive behaviour (e.g., Gross, 2002, 2015). While expressive suppression is known to decrease emotion expression but not negative emotional experience, as well as to impair memory and to increase sympathetic activation (e.g., increased cardiac reactivity and electrodermal responding), cognitive reappraisal is considered a particularly effective emotion regulation strategy that reduces experience and expression of the emotion and improves memory (for a review see Gross, 2015).

A particular variation of reappraisal that implies not only a reduction of the negative emotional response, but aims to up-regulate positive emotions is referred to as 'positive reappraisal' (e.g., Schartau, Dalgleish, & Dunn, 2009; Shiota & Levenson, 2009, 2012). It

involves focusing on positive aspects or beneficial outcomes of a negative event (Folkman & Moskowitz, 2000) and is thought to foster positive emotions even in negative situations (Tugade & Fredrickson, 2004). Individuals who engaged in positive reappraisal maintained positive emotions in response to unpleasant films (Shiota & Levenson, 2012), and even increased positive responses to negative pictures, recent stressful events, and past interpersonal offenses (McRae, Ciesielski, & Gross, 2012; Rood, Roelofs, Bögels, & Arntz, 2012; Witvliet, Knoll, Hinman, & DeYoung, 2010). Positive reappraisal helped learners in boring learning situations to maintain enthusiasm (Leroy, Grégoire, Magen, Gross, & Mikolajczak, 2012) and it led to more positive, aroused affect than expressive suppression or no regulation (Strain & D'Mello, 2015). Individuals who reappraised negative pictures used positive reappraisal more frequently and responded more positively when they were instructed to strive for the goal of increasing positive emotions, as compared to the aim of decreasing negative emotions (McRae et al., 2012).

Results on physiological effects of positive reappraisal suggest that it may involve unique physiological profiles that differ from reappraisal aiming at a down-regulation of negative emotions (cf., McRae & Mauss, 2016), with positive reappraisal increasing cardiac reactivity (Shiota & Levenson, 2012) and producing smaller decreases in skin conductance (McRae et al., 2012). The few studies that compare explicit positive reappraisal with expressive suppression yielded heterogeneous results. Butler, Gross, & Barnard (2014) found that positive reappraisers experienced more positive emotions than suppressors, but showed no effects on skin conductance or cardiovascular measures, whereas Lohani and Isaacowitz (2014) observed increases in skin conductance for both positive reappraisal and expressive suppression, but no differences in mood. Based on the limited existing findings, both positive reappraisal and expressive suppression may involve increases in physiological activation, depending on the specific context. Additional research on physiological effects of the two emotion regulation strategies is clearly needed.

1.4. Effects of positive reappraisal on academic learning and achievement

While the influence of emotions on learning and achievement has been the focus of many studies, emotion regulation effects and their underlying processes received less attention in educational research. In academic contexts, cognitive reappraisal seems to be positively related to the use of learning strategies whereas suppression was associated with less use of learning strategies (Ben-Eliyahu & Linnenbrink-Garcia, 2013, 2015). Furthermore,

cognitive reappraisal was observed with desirable effects on academic outcomes such as memory and motivational variables (Davis & Levine, 2013; Goetz et al., 2012; Gross, 2015; Kim & Hodges, 2011). More specifically, explicitly *positive* reappraisal in boring learning situations was found to be associated with increased task performance (Leroy, Grégoire, Magen, Gross, & Mikolajczak, 2012) and higher performance in a knowledge test than expressive suppression or no regulation (Strain & D'Mello, 2015). Since boredom involves relatively low levels of negative valence (cf., Goetz & Hall, 2014) it remains to be examined whether positive reappraisal is also effective with more intense negative emotions (e.g., when intense negative affect is induced by film or by negative feedback). Moreover, it is unclear how positive reappraisal compares not only to unregulated emotions and expressive suppression but also to reappraisal that aims at reducing negative emotions.

When it comes to interventions, the findings that exist to date (e.g., Leroy, Grégoire, Magen, Gross, & Mikolajczak, 2012; Strain & D'Mello, 2015) suggest that an intervention to foster emotion regulation in educational settings should particularly promote the use of positive emotion-regulatory goals in order to facilitate positive affect and minimize the self-control costs. Further, according to Gross (2015), emotion regulation interventions should include a broader range of strategies instead of fostering single emotion regulation strategies. Other than cognitive change (e.g., reappraisal), situation selection and modification, attentional deployment, and response modulation and should be given equal attention in interventions and be tailored to the up-regulation of positive emotions.

1.5. Effects of positive reappraisal on cognitive and self-control resources

The effects of emotion regulation strategies on self-control resources, in particular effects of positive reappraisal, have received little attention so far. Detached reappraisal (i.e., adopting a neutral perspective in order to disengage from and thereby reduce negative emotions; e.g., Shiota & Levenson, 2012) has been shown to draw less on self-control resources (cognitive ability, performance on the Stroop task) than expressive suppression (Johns, Inzlicht, & Schmader, 2008; Sheppes, Catran, & Meiran, 2009; Sheppes & Meiran, 2008). Explicitly positive reappraisal is assumed to rely to an even lesser degree on self-control resources as it focuses on and reinterprets emotional aspects, thus requiring less redirecting of attention to unemotional aspects than detached reappraisal (see Richards & Gross, 1999; Shiota & Levenson, 2009). Evidence on beneficial effects of positive

reappraisal on academic learning and achievement (Ben-Eliyahu & Linnenbrink-Garcia, 2015; Leroy et al., 2012; Strain & D'Mello, 2015) supports this line of reasoning: Positive reappraisal may draw less on self-control resources than expressive suppression or no regulation and may hence promote learning efforts and outcomes.

To specify the effects of emotion regulation strategies in an educational context, it is also crucial to understand their influence on working memory which represents a key factor in academic contexts as it is considered a basic cognitive resource needed to acquire new knowledge and skills and to perform intellectual tasks (cf., Dehn, 2008; Pickering, 2006). Working memory capacity is associated with a variety of cognitive abilities in academic contexts like reading comprehension or performance in academic tests (Alloway & Alloway, 2010; Barrett, Tugade, & Engle, 2004; Gathercole, Pickering, Knight, & Stegmann, 2004). Hofmann, Schmeichel, and Baddeley (2012) suggest that working memory capacity represents the limited 'workspace' required for cognitive as well as self-regulatory demands. In line with this view, research on ego depletion suggests that emotion regulation may impair cognitive processing (i.e., working memory) by drawing on the same finite pool of (self-control) resources (e.g., Schmeichel, Vohs, & Baumeister, 2003). Accordingly, attempts to regulate emotions have been found to be able to decrease working memory capacity (Johns et al., 2008; Schmeichel, 2007) but the susceptibility of cognitive resources to emotion regulation seems to depend on the particular strategy: Reappraisal preserved whereas expressive suppression impaired cognitive performance (Johns et al., 2008). Since induced positive affect restored performance on self-control tasks (Tice et al., 2007) and enhanced working memory capacity as measured by operation span tasks (Storbeck & Maswood, 2016; Yang, Yang, & Isen, 2013), it was assumed that self-generated positive emotions resulting from positive reappraisal may also be able to reduce ego depletion and preserve self-control as well as working memory capacity.

1.6. Research objectives

The present dissertation strives to provide insights concerning the effectiveness, suitability, and trainability of emotion regulation strategies in the context of learning and achievement. In particular, it aims to shed light on the practical impact of positive emotion regulation from an educational perspective. For this purpose, it examines the effects of explicit positive reappraisal on emotion experience and physiology as well as on cognitive and self-control resources in learning and achievement situations and compares them with other emotion regulation strategies (expressive suppression) or strategy variations

(reappraisal that aims to reduce negative emotions) that focus on a mere reduction of negative emotions.

A first objective was to show that positive reappraisal is associated with affective and self-control benefits. The second objective was to illuminate the role of self-generated positive emotions for self-control capacity. Third, this research examined whether higher self-control resources as a result of emotion regulation are able to promote learners' self-regulated learning and working memory capacity. On that basis, a fourth objective of this work was to create and test an intervention to foster positive emotion regulation and self-regulated learning in students, also considering intervention effects on self-control.

2. Overview of Manuscripts

This section provides an overview of the three manuscripts contained in this dissertation. It summarizes purpose, method and main results of each manuscript and then discusses the results of all the studies together.

2.1. Manuscript A – "The Effect of Positive Reappraisal on the Availability of Self-control Resources and Self-regulated Learning"

2.1.1. Purpose of the study

Manuscript A is about an experimental study which examined whether positive reappraisal facilitates self-regulated learning by counterbalancing the depletion of self-control resources. The study investigated the effectiveness of two emotion regulation strategies – positive reappraisal and expressive suppression – with respect to the experienced emotions, physiological arousal, and consumption of self-control resources. A focus was put on the connection between positive emotions self-generated through emotion regulation and the availability of self-control resources. To understand the educational relevance of emotion regulation in consideration of self-control resources, the study further illuminated the impact of the self-control resources available after emotion regulation on subsequent self-regulated learning.

2.1.2. Method

We contrasted two experimental groups that used either positive reappraisal or expressive suppression to a control group (no regulation) in a mixed 3 (group) x 3 (time) randomized design. Sixty-one university students were instructed to engage in either positive reappraisal or expressive suppression to regulate negative emotions induced by a film clip on animal testing or to refrain from emotion regulation, respectively (random assignment to groups). Then, they worked on a self-regulated learning task in which they were asked

to prepare for a pretend knowledge test on the island of Malta. To enable self-regulation of learning, participants freely chose the style, quantity, and goals of their learning. They rated their current positive and negative emotions and availability of self-control resources before (baseline) and after watching the emotion inducing film (post-film), as well as after the learning sequence (post-learning). Moreover, their heart rate and electrodermal activity were measured and averaged from three phases (before the film, first half, and second half of the film). All subjective data (positive and negative emotions, availability of self-control resources, and indicators of self-regulated learning) were assessed using multi-item self-report scales. Psychophysiological measures were recorded continuously throughout the experiment using a portable biosignal recording device.

2.1.3. Results and conclusions

Analyses of variance (ANOVA) with simple contrasts confirmed that participants who engaged in positive reappraisal experienced more positive emotions and had more self-control resources available after the film than participants in the expressive suppression group. Moreover, a mixed-factors ANOVA accounting for changes in skin conductance across film phases showed that the use of positive reappraisal increased skin conductance during emotion regulation, as compared to suppressors and controls. Linear regression analyses confirmed that, irrespective of the type of emotion regulation, experiencing positive emotions after emotion regulation predicted post-film availability of self-control resources which was positively associated with subsequent self-regulated learning. A hierarchical multiple regression analysis that accounted for the groups and their possible moderating effects further showed that the association between self-control resources and self-regulated learning was eliminated for participants who had used positive reappraisal.

The study demonstrates that positive reappraisal and expressive suppression differ substantially: Positive reappraisal appears to be a more effective strategy than expressive suppression that leads to more positive affective outcomes, is associated with enhanced arousal, and is less resource-depleting. It also confirms both the association of positive emotional experience with self-control resources and the relevance of available self-control resources for self-regulated learning. The results are in line with the idea that self-control resources are needed for the self-regulation of learning and indicate that positive emotions can act as a means to enhance self-control resources, which in turn are available for activities that require self-control. The results indicate that positive reappraisal offers the potential to balance out negative effects of ego depletion on self-regulated learning.

2.2. Manuscript B – "Reappraisal of failure feedback: Consequences for affect, perceived self-control resources, and working memory capacity"

2.2.1. Purpose of the study

Manuscript B is about an experimental study that compared two variations ('tactics') of cognitive reappraisal used to regulate negative emotions in response to failure feedback. It investigated short-term effects of reappraisal tactics involving a more positive (P+) or less negative perspective (N-) on affect, perceived self-control, and working memory capacity. The study aimed to examine whether a P+ reappraisal tactic is associated with higher positive affect and smaller decreases in perceived self-control capacity (less ego depletion) than an N- tactic. Further objectives were to investigate whether positive emotions are generally predictive of the level of perceived self-control capacity and how perceived self-control capacity (affected by preceding emotion regulation) is connected with working memory capacity.

2.2.2. Method

In a mixed 4 (treatments) x 3 (time) design, two experimental groups – P+ vs. N- reappraisal tactic – and two control groups in which the emotion was either not regulated (no regulation, NR) or no emotion was induced (no treatment, NT) were compared. A sample of N = 118 participants, 87% of whom were university students were randomly assigned to the groups. After each participant had completed a short cognitive ability test, participants were instructed to adopt P+ or N- tactics to modify possible negative emotional reactions in case of a poor test score (control groups received no feedback/no tactic instruction). A negative emotion was induced by presenting a false poor test result to both experimental groups and the NR-control-group. Subsequently, participants completed a working memory task. They rated their affect and perceived self-control capacity at three times: before and after failure feedback as well as after the working memory task. A short computerized version of an intelligence structure test served as the cognitive ability task (ability scores were not part of the manuscript). The working memory task consisted of a computerized operation span task with total and partial memory scores being the focus of the analyses. Affect (valence, arousal, and dominance) and perceived self-control capacity were measured by self-report scales. Additionally, the individual techniques (thoughts)

participants had used to reappraise their alleged test failure were assessed (open-ended format).

2.2.3. Results and conclusions

Mixed-factors multivariate analyses of variance accounting for affect (valence, arousal, dominance) and perceived self-control capacity across the three assessments with following univariate analyses and t-tests revealed that only the P+ group managed to remedy positive valence and dominance during the working memory capacity task. In contrast to the different affective implications, the average consumption of perceived self-control resources and the impact on working memory capacity did not differ substantially for P+ and N- reappraisal. Also, both reappraisal groups made similar use of individual techniques to implement the instructed reappraisal tactics. Multiple regression analyses that collapsed across groups for each measurement point showed that perceived self-control capacity was higher when affect was more positive indicating that positive affect is generally interconnected with high self-control, irrespective of whether it emerges spontaneously or through reappraisal. Separate backward elimination regression analyses for the P+ and the N- group were calculated in order to examine how self-control and affect variables contribute to working memory capacity for the respective reappraisal tactic. Working memory capacity in N- reappraisers was extended with higher perceived self-control capacity while affect had no influence. However, in P+ reappraisers, the link between perceived self-control capacity and working memory capacity was moderated by affect: High dominance and negative valence enabled P+ reappraisers to perform well even under conditions of ego depletion, whereas non-depleted P+ reappraisers' working memory capacity profited from low dominance and positive valence. Thus, the relationship between perceived self-control capacity and cognitive performance seems to depend on the reappraisal tactic and its affective outcomes.

The findings in manuscript B corroborate a beneficial role of P+ reappraisal for positive affect and yield information on the roles of P+ and N- reappraisal in cognitive performance. P+ reappraisal appears to be an effective emotion regulation tactic capable of restoring positive affect even in situations of academic failure. However, both tactics are able to either facilitate or harm cognitive performance, depending on their affective impact and self-control capacity, and may thus become relevant to academic success. Since adopting a P+ perspective was shown to be more crucial for the effectiveness of emotion regulation than any specific individual techniques, interventions may best focus on

teaching broad P+ tactics.

2.3. Manuscript C – "Integrating Emotion Regulation in Programs of Self-regulated Learning – Training Effectiveness and Consequences for Self-control Capacity in Secondary School Students"

2.3.1. Purpose of the study

Manuscript C is about a quasi-experimental study that tested the effectiveness of an integrated training program that fosters both self-regulated learning and emotion regulation in secondary school students, compared to an emotion regulation-only and a control program. The objective of the study was to investigate the effects of the training programs on self-regulated learning, emotion regulation, and self-control capacity. While the integrated program was expected to promote both emotion regulation and self-regulated learning, the emotion regulation-only program was assumed to mainly foster emotion regulation. Since both programs were expected to support self-control capacity, a facilitation of self-regulated learning was also expectable for the emotion regulation-only program. The control program was not supposed to affect the dependent variables.

2.3.2. Method

Two experimental groups – integrated training of emotion regulation and self-regulated learning strategies (IT) vs. pure emotion regulation strategies training (ET) – and a control group that received training of cognitive learning techniques (CT) were contrasted in a mixed 3 (groups) x 2 (time) quasi-experimental design. The sample consisted of 8 groups of secondary school students (total N = 106; 8^{th} to 10^{th} grade) from 7 German secondary schools from the highest track ('Gymnasium') who volunteered to participate. The school-based groups were randomly assigned to one of the programs. The IT program combined emotion regulatory (situation modification, attentional deployment, cognitive change, reaction modification) with metacognitive/motivational strategies (goal setting, planning, concentration, motivation in addition to emotion regulation contents), thus representing an extension of the ET program as regards contents. The CT program exclusively focused on cognitive learning techniques, strictly avoiding overlaps with the two other programs.

Each program involved three 90-minute sessions in weekly intervals. Two weeks

before and after the intervention, trait use of emotion regulation and self-regulated learning strategies were assessed via multi-scale questionnaires, as well as trait self-control capacity which was measured via a self-report scale. Participants' knowledge on the contents of the three training sessions was tested by means of a test covring the contents of both the IT and the ET program.

2.3.3. Results and conclusions

T-tests showed that the ET program led to a knowledge gain in emotion regulation and the IT program entailed a knowledge increase in self-regulated learning. Mixed-factors analyses of variance calculated for each emotion regulation strategy at pre- and post-assessment with follow up paired t-tests revealed that despite the lack of a knowledge increase for emotion regulation in the IT group, the use of the emotion regulation strategies 'Situation Analysis & Strategy Development' increased significantly in this group whereas the ET program was less effective. Neither training program was able to promote the strategy of 'Positive Perspective'. Similar analyses for self-regulated learning strategies yielded that in the IT group, the use of the whole range of strategies was enhanced. The ET program also increased motivation strategies, thus specifically affecting the preaction phase of self-regulated learning. Participants of the integrated program also showed a tendency of augmented self-control capacity.

The results in manuscript C demonstrate the benefits of an integrated approach to fostering academic emotion regulation in programs of self-regulated learning. An effective program was created that promoted both self-regulated learning and emotion regulation skills in secondary school students. The program broadens existing approaches by training positive emotion regulation for the full range of emotion regulation strategies described in the literature (cf., Gross, 2015).

3. Summarizing discussion

This section provides an overview of the most central theoretical and practical implications of the results presented in the three manuscripts according to the research objectives.

Emotions are an important factor in learning and achievement situations and effective emotion regulation is thought to facilitate successful (self-regulated) learning and academic performance. Nevertheless, the effects of emotion regulation on facets of self-regulated learning and achievement have received little attention in the literature. In particular, the potential of positive emotion regulation for educational contexts has been neglected. This dissertation aimed to contribute to this field of research by investigating the effectiveness of emotion regulation strategies in learning and achievement situations. It examined the effects of explicit positive reappraisal on experiential and physiological aspects of emotion as well as cognitive and self-control resources. Furthermore, it tested an intervention to foster positive emotion regulation in an academic context. The first objective was to show that positive reappraisal has affective and self-control advantages over strategies and strategy variations that aim at reducing negative emotions (expressive suppression; reappraisal reducing negative emotions). The second aim was to examine the importance of positive emotions that result from emotion regulation for self-control capacity. Third, this work investigated whether higher self-control capacity enhances self-regulated learning and cognitive performance (working memory capacity). A fourth intention was to create and test an intervention to foster positive emotion regulation in a school context.

3.1. First research objective: Investigating effects of positive reappraisal on affect and self-control

The first research objective that referred to the effects of positive reappraisal on affect and self-control was dealt with in manuscript A and B: Manuscript A compared positive reappraisal and the strategy of expressive suppression with respect to experienced emotions, physiological arousal, and the consumption of self-control resources. In manuscript B, positive reappraisal was contrasted with reappraisal that focuses on the reduction of negative emotions (N- reappraisal) concerning the impact on affect and self-

control.

When positive reappraisal was compared to suppression (manuscript A), the results confirmed that more positive emotions were experienced by positive reappraisers while there was no difference in negative emotional experience. Also, positive reappraisers had more self-control resources available after emotion regulation. The results suggest that even when negative emotions are experienced, positive reappraisal is better able to enhance positive emotions in a learning situation than suppression. The findings add to research on beneficial short-term effects of positive reappraisal on emotional experience (e.g., Leroy et al., 2012; McRae et al., 2012; Rood et al., 2012; Strain & D'Mello, 2015) and supplement literature on emotion regulation effectiveness (Webb, Miles, & Sheeran, 2012), contributing to an educational perspective on emotion regulation (Jacobs & Gross, 2014).

The finding that positive reappraisal is less costly with regard to self-control resources than suppression is consistent with previous findings inside and outside of the educational context (Ben-Eliyahu & Linnenbrink-Garcia, 2015; Johns et al., 2008; Leroy et al., 2012; Sheppes et al., 2009; Sheppes & Meiran, 2008; Strain & D'Mello, 2015) and further adds to the growing body of evidence on differential reappraisal effects that has mostly focused on detached reappraisal. Moreover, the result is in line with the idea that in contrast to suppression, reappraisal adjusts emotions at an early stage, thus not requiring ongoing monitoring and inhibition of emotional responses (Richards & Gross, 1999) which would tax self-control.

Positive reappraisal was further associated with higher physiological arousal than expressive suppression over the emotion regulation period. Along with McRae et al.'s (2012) findings the result supports the idea that positive reappraisal is associated with higher electrodermal activity than strategies that aim at reducing negative emotions. McRae et al. proposed a qualitative shift in valence from arousing negative affect to arousing positive affect for positive reappraisal, whereas reappraisal decreasing negative affect is thought to involve a quantitative reduction of emotional experience and arousal. The results also match the association of more activated positive emotions with reappraisal in contrast to more deactivated positive emotions observed with suppression (Ben-Eliyahu & Linnenbrink-Garcia, 2013). They add to a growing body of evidence on increased physiological activation for positive reappraisal (McRae et al., 2012; McRae & Mauss, 2016; Shiota & Levenson, 2012). This activation may be able to facilitate actions towards (learning) goals or the improvement of negative situations and may consequently help

learners to attain desirable outcomes such as academic or vocational success.

Based on the findings of manuscript A, positive reappraisal appears to be more effective than expressive suppression, leading to more positive affective outcomes, enhanced arousal, and less resource-depletion. According to the process model of emotion regulation (Gross, 1998b) positive reappraisal and suppression differ in more aspects than the aim of increasing positive or, respectively, decreasing negative emotions: they affect different stages in the emotion generative process and different emotion components. For this reason it seemed necessary to compare increase-positive and decrease-negative emotion regulation tactics within the strategy of reappraisal in the following study (manuscript B).

When in manuscript B, positive reappraisal was compared with reappraisal that aims at a reduction of negative affect (N- reappraisal), the results showed a regain of positive valence and dominance only for positive reappraisers. Although positive reappraisal and N- reappraisal did not result in clearly distinguishable levels of positive affect, this exclusive regain may indicate a higher effectiveness of positive reappraisal. Unlike with studies showing that positive reappraisal maintains (Leroy et al., 2012; Shiota & Levenson, 2012) or increases positive affect (Rood et al., 2012; Strain & D'Mello, 2015; Witvliet et al., 2010), the findings in manuscript B rather suggest a restoring function of positive reappraisal which may be a result of a different timing of measurements that allowed for a more fine-grained observation of affective processes.

In contrast to the different affective impact of positive and N- reappraisal, both consumed self-control resources to a similar extent. Unlike Johns et al.'s (2008) findings on a preservation of self-control resources through reappraisal, no resource-conserving effect was found for either of the two reappraisal tactics. This may be due to the high difficulty of regulating emotions that result from failure feedback (see Webb, Miles, & Sheeran, 2012) which may account for similar resource demands of positive reappraisal and less effective N- reappraisal.

The findings in manuscript B are partially compatible with the results in manuscript A, as they demonstrate that positive reappraisal is able to effectively restore positive affect even in response to failure feedback. Importantly, they supplement the findings in manuscript A on an advantage of positive reappraisal over expressive suppression. They show that positive reappraisal is also more effective than N- reappraisal which did not repair positive affect in the failure situation. While in comparison with suppression, positive reappraisal demanded less self-control resources, it had no resource-related

advantage over N- reappraisal.

3.2. Second research objective: Examining the importance of positive emotions for self-control resources

The second research objective which referred to the role of positive emotions for self-control was dealt with in manuscript A and B. In both studies the intensity of positive emotions, or, respectively, positive valence, which resulted after emotion regulation was positively related to the availability of self-control resources. This resource-promoting capability of positive emotions was independent of whether emotion regulation was used at all and which specific strategy or tactic was employed to elicit them. In line with ego depletion research (Tice et al., 2007), the results support the idea that positive emotions generally promote self-control resources – as externally induced positive emotions and irrespective of whether they emerge spontaneously or through emotion regulation. Self-control resources that have been enhanced by positive emotions may facilitate various activities that require self-control. Thus, positive emotion regulation may have desirable consequences associated with high self-control, e.g., intellectual performance (Schmeichel et al., 2003) and task persistence (Tice et al., 2007).

3.3. Third research objective: Investigating whether higher self-control promotes self-regulated learning and cognitive performance

The third research objective which referred to the promotion of learners' self-regulated learning and working memory capacity through higher self-control resources was dealt with in manuscript A and B.

In manuscript A, it was shown that the availability of self-control resources after previous emotion regulation was predictive of subsequent overall self-regulated learning. This supports the notion that self-control resources are needed for the self-regulation of learning (Ben-Eliyahu & Bernacki, 2015; Ben-Eliyahu & Linnenbrink-Garcia, 2015), including motivational, meta-cognitive, and behavioural features such as self-efficacy, goal setting, and learning outcomes. Consequently, investigations of self-regulated learning need to consider possible behavioural, cognitive, and emotional processes that concurrently draw on self-control resources (Ben-Eliyahu & Bernacki, 2015). This may be especially

important when it comes to real-world learning, since concurrent processes like distracting events and thoughts or temptations (cf., Leroy et al., 2012) are less controllable in these settings and may interfere with learning. However, this general association of self-control availability and self-regulated learning was non-existent when only positive reappraisers were considered: Positive reappraisal was found to reduce the importance of self-control resources for self-regulated learning, thus offering the potential to wipe out negative aftereffects of ego depletion. Hence, positive reappraisal may help maintaining self-regulated behaviors, fostering self-discipline, and facilitating high performance (e.g., in the face of deadlines or in test situations) even in depleted learners.

In manuscript B, self-control capacity was found to be positively associated with working memory capacity in N-reappraisers. As for positive reappraisers, however, the association was also moderated by the affective state. In line with evidence on the overlap of self-control and working memory capacity (Hofmann et al., 2012), the results are consistent with the view of working memory capacity as a provider of capacity for both cognitive and self-regulatory demands. Tactics of reappraisal may influence cognitive performance and hence academic achievement via their affective and resource-related outcomes. Unlike findings of enhanced working memory capacity with induced positive affect (Storbeck & Maswood, 2016; Yang et al., 2013), working memory was improved by positive affect only in non-depleted positive reappraisers.

To sum up, the influence of self-control resources on self-regulation and cognition seems to be rather complex as it interacts with the use of emotion regulation strategies and their effectiveness. Interestingly, in both manuscripts, positive reappraisal appeared to have a compensating function: (a) Positive reappraisal helped depleted learners to maintain self-regulated learning. (b) Positive reappraisal improved working memory in depleted individuals, but only when their affective state was characterized by high dominance and negative valence. Neither expressive suppression (examined in manuscript A) nor N-reappraisal (examined in manuscript B) showed such a potential to counterbalance ego depletion effects.

3.4. Fourth research objective: Testing an intervention to foster positive emotion regulation and self-regulated learning

The fourth research objective was to create and test an intervention to foster self-regulated learning and positive emotion regulation in students, also taking intervention effects on

self-control into consideration. It was dealt with in manuscript C. The study presented in manuscript C was based on the experimental (laboratory) findings on short-term effects of positive reappraisal in learning situations (manuscript A and B). It aimed to investigate the practical implementation of positive emotion regulation in order to better evaluate the role of positive reappraisal and other positive strategies in education. The study addressed a broader range of negative academic emotions (e.g., anxiety or anger; Pekrun et al., 2002) and involved the full range of emotion regulation strategies as postulated by the process model of emotion regulation (Gross, 1998b) in a real world academic learning context. It compared an integrated training program that fosters both self-regulated learning and emotion regulation with an emotion regulation-only and a control program.

The results showed that the integrated training program promoted emotion regulation more effectively than the emotion regulation-only program although in the latter program more time and practice were spent on the topic and a knowledge gain on emotion regulation was observed. The integrated training program promoted the use of two emotion regulation strategies (‘Situation analysis and Strategy development’) that mainly refer to Gross' (1998) emotion regulation sets of situation selection and situation modification. It thus facilitated reflecting on the emotion-eliciting situation as well as planning and taking actions to alter one’s emotions. Neither program succeeded in increasing the use of ‘Positive Perspective’. Possibly, due to the relative difficulty of cognitive change strategies that involve positive emotion-regulatory goals (Scheibe & Schmitz, 2012, 2013), more opportunities to practice and increase the use of this strategy may be necessary to effectively foster it.

All trained strategies of self-regulated learning were effectively promoted by the integrated training program. Without explicit training of self-regulated learning strategies, the emotion regulation program also increased motivation strategies and showed a tendency to support ‘Planning/goal setting’. A conceptual overlap of the emotion regulation and motivation regulation may explain the increase in motivation strategies, e.g., focusing on interesting aspects of a task probably serves both regulation types. As for ‘Planning/goal setting’, it seems most likely that the increase tendency was a side effect of the boost in motivation strategies. Self-control capacity – which could otherwise have accounted for the slight increase– was not promoted by the emotion regulation program. Consistent with its effects on situation selection and modification, the emotion regulation program was primarily effective in the preaction phase of self-regulated learning. Action and postaction indicators of self-regulated learning might have profited from an increase in

Positive Perspective.

While for the integrated program a tendency to promote self-control was found, the emotion regulation program failed to enhance self-control. This is consistent with the emotion regulation program's lesser ability to promote positive emotion regulation strategies that may have fostered self-control via positive emotion. When the mild enhancement of self-control would be attributed to the integrated program's effective support of positive emotion regulation, the finding would argue for positive emotion-regulatory goals entailing self-control benefits (cf., Scheibe & Schmitz, 2012, 2013; Tice et al., 2007). Since no intervention was included that exclusively trains self-regulated learning, it cannot be ruled out that the increased use of self-regulated learning strategies was responsible for the increase in self-control in the integrated program group. However, this interpretation would be inconsistent with the strength model of self-control which posits that all kinds of self-regulatory acts draw on a limited resource (Baumeister & Heatherton, 1996).

In all, the results in manuscript C show a superiority of the integrated program with respect to self-regulated learning, emotion regulation, and self-control capacity over the emotion regulation-only program.

3.5. Limitations and future directions

This section addresses the major limitations of the studies presented in the three manuscripts and indicates how they may be used to direct future research.

In both manuscript A and B, following the positive reappraisal instruction was rated more difficult than the other emotion regulation instructions. It was also rated less successful than suppression or no regulation in manuscript A and participants reported a lower instruction compliance than for N- reappraisal. Since a higher number of regulation attempts is known to enhance the effects of emotion regulation (Webb et al., 2012), study designs that involve reappraisal practice (cf., Kim & Hodges, 2011; Schartau et al., 2009) may be required to reduce reappraisal difficulty, boost instruction compliance and regulation success, hence providing further insights on emotion regulation effectiveness.

In manuscript A and B self-control resources were measured only by self-report, in manuscript A only by a single-item measure. Consistent use of multi-item measures (e.g., the full German State Self-control Capacity Scale; Bertrams et al., 2011) as well as additional behavioural indicators of self-control capacity (e.g., the Stroop task; c.f., Sheppes & Meiran, 2008) or procedures that contrast active versus passive responding (cf.,

Baumeister et al., 1998) could be included used to reduce the risk of measurement artifacts and to confirm the results. As for the measurement of emotions, the use of additional indirect measures of emotional experience like implicit tests (e.g., IPANAT; Quirin, Kazén, & Kuhl, 2009) would complement the results based on self-report and help reduce the risk of any possible demand effects. Manuscript C also suffered from a measurement issue. The deployed measure of emotion regulation strategies (Scheibe, 2009) did not map the trained emotion regulation strategies well. Possible increases in rather specific strategies might have been present but undetectable with the used instrument. Future intervention studies should use scales that match better and differentiate as exactly as possible the trained strategies, combining existing scales (e.g., for cognitive change strategies: CERQ by Garnefski & Kraaij, 2007; for reaction modulation strategies ERQ by Gross & John, 2003; for situation modification, cognitive change strategies: Scheibe, 2009) and supplementary new scales. Most scales will require adaptations in order to enable the measurement of positive up-regulation. In manuscript C, also, additional objective data (e.g., academic achievement/grades) would have supported self-report-based results and should be included in future studies.

Manuscript A involves a relatively small sample size with a majority of female psychology students; manuscript B also relied on a sample dominated by students. Future studies should ensure equal examination of males and females (as in manuscript B) and should aim at a more diverse sample.

Manuscript C lacked an additional experimental condition consisting in a pure self-regulated learning training program which would facilitate the identification of the source of self-control capacity gains also in future research. Moreover, future interventions may profit from increased practice time and a focus on fewer strategies in order to foster the use of positive perspective reappraisal more effectively.

To gain more knowledge on the potential of positive reappraisal and other positive emotion regulation strategies, a promising approach could be to investigate varying degrees of strategy practice in experimental as well as in intervention studies. To address possible timing effects, frequent assessments could reveal possible short-term changes. Also, medium and longer term consequences of emotion regulation strategy use that might differ from the short term effects would be of interest. Knowing factors other than strategy practice that determine individual variability in emotion regulation effectiveness and self-control consumption may facilitate the prediction of self-controlled behavior or working memory capacity. In that regard, it may be especially promising to consider implicit

theories about self-control being an (un)limited resource (Job, Dweck, & Walton, 2010). Lastly, future studies may consider more diverse real world academic and non-academic learning situations (e.g., learning at school, homework, learning on the job, or even learning to drive or commencing new sports) in order to better evaluate the role of emotion regulation in education.

3.6. Conclusions

By integrating the emotion regulation approach from general psychology with models of self-control from social psychology and learning-associated concepts from educational psychology, this dissertation contributes to the still developing field of emotion regulation in education (cf., Jacobs & Gross, 2014). It generated new insights into the factors and processes relevant to (non-)academic learning and success by investigating how emotion regulation strategies impact on emotional well-being, self-control capacity, cognitive performance, and self-regulated learning and how effective emotion regulation can best be fostered. In search for emotion regulation strategies that promote learning and achievement, the studies presented in this dissertation offered a wealth of information on beneficial and detrimental influences of emotion regulation. Since research on the emotion regulation strategy of positive reappraisal is still rather scarce, especially in educational psychology, the studies provide valuable information about its functioning and corollaries in comparison with other strategies or strategy variations. The beneficial consequences of positive reappraisal for emotions were highlighted in two studies: Positive reappraisal appears to be a difficult yet effective emotion regulation strategy. As for self-control demands, positive reappraisal was shown to be advantageous over the response-focused emotion regulation strategy expressive suppression but not over N- reappraisal. Initial evidence was provided on the rather complex influence of emotion regulation on self-regulated learning and cognitive performance: While self-regulated learning was influenced by the emotion regulation strategies' demand of self-control resources, cognitive performance also depended on their affective impact. Based on the experimental findings on positive reappraisal in comparison to strategies that aim at a down-regulation of negative emotions, a training program to foster positive emotion regulation strategies was developed and integrated in a program to foster self-regulated learning and was shown to be effective.

The findings in this thesis underline the relevance of emotion regulation for educational contexts. How learners regulate their emotions is relevant to test preparation

and test taking as well as a broad range of cognitively and self-control demanding learning situations and it may be important in many other academic and non-academic learning situations. Enhancing positive emotion regulation in learners may be a key component in fostering self-regulated behaviour, cognition, and consequently academic success. Methods to enhance positive ER (for a review of short-term and long-term positive ER interventions see Quoidbach & Gross, 2015) may for example be instruction or training programs implemented in schools or higher educational institutions (Denny & Ochsner, 2014; Macklem, 2008, 2011; Pincus & Friedman, 2004; Weytens, Luminet, Verhofstadt, & Mikolajczak, 2014), adaptations of clinical/therapeutic interventions such as cognitive bias modification (Schartau et al., 2009; Woud, Holmes, Postma, Dalgleish, & Mackintosh, 2012) or the use of special media (e.g., intelligent tutoring systems; Strain, Mello, & Graesser, 2011). However, consequences of positive emotion regulation strategies are still not well enough understood, e.g., in the school setting, homework situations, or when long term goals are involved. Since the effects of positive reappraisal seem to be rather complex, further evidence, in particular studies with larger samples and meta-analyses on positive reappraisal effects, will be needed in order to reliably determine whether positive reappraisal should be encouraged by teachers and educators.

The thesis also provided initial evidence that teaching positive emotion regulation strategies contributes to programs that foster self-regulated learning in secondary school students. This provides new insights not only for intervention research but also for practical application. Individuals who are able to effectively regulate their emotions will be better equipped not only for successful self-regulated learning, (non-)academic and vocational achievement. They might further be able to interact in better ways with people and to manage setbacks, changes, and even hardship in their lives. Furthermore, by supporting students' self-control capacity, desirable outcomes such as emotional well-being, academic performance, health behavior, or relationship quality (de Ridder et al., 2012) may also be promoted. A promising next step would be to examine short- and longer-term effects of positive emotion regulation on academic emotions, specific phases of the learning process, and academic success.

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II. PART 2: ORIGINAL MANUSCRIPTS

5. Manuscript A

The Effect of Positive Reappraisal on the Availability of Self-control Resources and Self-regulated Learning

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Abstract

Effectively regulating negative emotions is important for successful self-regulated learning. However, research to date has hardly examined which emotion regulation strategies might benefit self-regulated learning and its underlying mechanisms. In an experimental study, it was examined whether positive reappraisal facilitates self-regulated learning by counterbalancing the depletion of self-control resources. Sixty-one university students engaged in either positive reappraisal or expressive suppression to regulate negative emotions induced by a film clip and then worked on a self-regulated learning task. Participants who engaged in positive reappraisal experienced more positive emotions after the film and had more self-control resources available than participants in the expressive suppression group. Moreover, the use of positive reappraisal increased skin conductance during emotion regulation, as compared to expressive suppression. Irrespective of the type of emotion regulation, experiencing positive emotions predicted post-film availability of self-control resources which was positively associated with subsequent self-regulated learning. The results demonstrate the beneficial affective and resource-related consequences of positive reappraisal as well as its potential for fostering self-regulated learning.

Keywords: emotion regulation; self-regulated learning; self-control; positive reappraisal; psychophysiology

The ability of self-regulated learning is considered to be a core competency relevant to academic and non-academic learning. Process-models (Pintrich, 2000; Schmitz & Wiese, 2006; Zimmerman, 2000) refer to self-regulated learning as a process of adaptive goal pursuit: Learners set their own goals and strive towards their accomplishment via monitoring and regulating cognition, motivation, and behaviour (Pintrich, 2000). One important aspect of self-regulated learning is emotions, which have been shown to significantly influence learning and achievement in both beneficial and detrimental ways (Pekrun, 2016; Pekrun, Frenzel, Goetz, & Perry, 2007; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011; Webster & Hadwin, 2015). Therefore, regulating emotions that may impair or enhance learning is presumed to be crucial for the success of self-regulated learning.

Self-control refers to the limited capacity to alter one's responses, to adjust them to standards, and to promote the pursuit of long-term goals (Baumeister, Vohs, & Tice, 2007; Inzlicht & Schmeichel, 2012). Pertinent models of self-control (Baumeister & Heatherton, 1996; Inzlicht & Schmeichel, 2012) assume that different forms of self-control rely on and compete for that limited resource (cf., Hagger, Wood, Stiff, & Chatzisarantis, 2010). This implies that by drawing on the same self-control resources, emotion regulation (ER) may impair self-regulated learning. However, since positive emotions were found to remedy the depletion of self-control resources (Tice, Baumeister, Shmueli, & Muraven, 2007) the question may be raised whether positive-oriented ER strategies may benefit self-regulated learning by counterbalancing the depletion of self-control resources.

In this study, it was investigated whether the affective and resource-related impact of ER strategies focused on increasing positive emotions differs from strategies focused on decreasing negative emotions. Moreover, implications for subsequent self-regulated learning were examined.

5.1. Introduction

5.1.1. The Role of Emotions and Their Regulation for Self-regulated Learning

Due to dynamically changing environments and the consequential need for lifelong learning, the relevance of self-regulated learning for both academic and non-academic learning, vocational development, and professional careers has often been emphasized (Bjork, Dunlosky, & Kornell, 2013; Dignath & Büttner, 2008; European Parliament and Council of the EU, 2006; Schmitz, Schmidt, Landmann, & Spiel, 2007) has often been

emphasized. Pintrich's (2000) general framework classifies common features of self-regulated learning concepts (goal setting, monitoring, and control and regulation processes) and areas of regulation (cognition, motivation/affect, behaviour, and context). In line with the framework, the process model of self-regulated learning (Schmitz & Wiese, 2006) includes situational demands, affective, motivational (e.g., self-efficacy), metacognitive (e.g., monitoring), and behavioural aspects (e.g., learning outcome) of learning processes. The model distinguishes three phases (pre-action, action, and post-action) of a learning process, containing a total of 15 subcomponents (Schmitz & Wiese, 2006). In order to allow for a condensed measurement of self-regulated learning, 8 parameters were selected that cover and may be representative for all three learning phases. Table 1 describes these selected parameters of a learning process which are addressed in this study.

Emotions are presumed to play an important role in self-regulated learning. They are thought to unfold in a situation-attention- appraisal-response sequence, i.e., external or internal situations are attended to and evaluated in the face of the current individual context entailing changes in subjective experience, behaviour, and physiology (cf., Gross, 2015). ‘Academic emotions’ (Pekrun et al., 2002) involve positive as well as negative emotions task- or self-related (e.g., joy about success, anxiety) as well as social emotions (e.g., admiration, envy; c.f., Järvenoja, Volet, & Järvelä, 2013). In Schmitz and Wiese's (2006) process model, emotions are explicitly included in the pre-action (e.g., hope for good achievement, fear of test demands) and post-action phases (e.g., pride over a good grade, disappointment due to failure). Research has shown that (academic) emotions may affect self-regulated learning in the action phase as well (e.g., enjoyment or boredom during learning) (Pekrun et al., 2002). With positive emotions, beneficial effects were observed on overall academic achievement, cognitive resources and components of self-regulated learning such as motivation and the use of metacognitive learning strategies and self-evaluations of goal attainment, whereas negative emotions had a detrimental effect (Pekrun et al., 2007, 2002; Webster & Hadwin, 2015). Dealing efficiently with emotions, in particular negative emotions, should thus facilitate successful self-regulated learning. While the role of emotions in self-regulated learning is well acknowledged and emotions are incorporated in models of self-regulated learning (Zimmerman, 2000), the influence of regulating these emotions on the learning process has been neglected. ER strategies should be considered as important for learning as cognitive and behavioural regulation forms (c.f., Ben-Eliyahu & Linnenbrink-Garcia, 2013), and ER should be integrated in models of self-regulated learning (Ben-Eliyahu & Linnenbrink-Garcia, 2015; c.f., Pintrich, 2000).

Table 1

Description of parameters of self-regulated learning addressed in this study

Phase	Self-regulated learning component	Exemplification
Pre-action phase	intrinsic / extrinsic motivation to learn (cf., Ryan & Deci, 2000)	Learners are interested in the learning matter or are rather learning because they strive for a good grade or the approval of others.
	perceived self-efficacy (cf., Bandura, 1997)	Learners are more or less confident of their capacity to deal with the learning task.
	positive / negative academic emotions (cf., Pekrun, Goetz, Titz, & Perry, 2002)	Learners experience positive or negative emotions when it comes to learning.
Action phase	Learning quality (resource-management strategy; cf., Pintrich, Smith, Garcia, & Mckeachie, 1993; Schmitz & Wiese, 2006)	Learners invest more or less effort on learning.
	Effective learning time / learning quantity (cf., Pintrich, Smith, Garcia, & Mckeachie, 1993; Schmitz & Wiese, 2006)	Learners invest their time more or less effectively on learning.
Post-action phase	reflection and evaluation of learning and goal attainment (cf., Zimmerman, 2000)	Learners are more or less satisfied with their learning outcome.
	positive / negative academic emotions (cf., Pekrun, Goetz, Titz, & Perry, 2002)	Consistent with satisfaction, learners experience positive or negative emotions.

5.1.2. Effectiveness of ER Strategies

Individuals often adjust their emotions in order to reach their (academic) goals. As stated by Gross (1998a), ER refers to influencing the nature of the emotions we experience, the time when they arise, and how they are experienced and expressed in outward behaviour. Since ER may target different parts of the emotion-generative process (Gross & Thompson, 2007), ER strategies are roughly assigned to either antecedent-focused or response-focused strategies. Antecedent-focused strategies operate early in the emotion generative process and are generally thought to be more effective than response-focused strategies that operate at a later stage (i.e., after the emotional response tendency has been fully activated). Response-focused strategies, but not antecedent-focused strategies, seem to have a negative impact on verbal memory (Gross, 2002). However, research barely addressed the effects of ER on the full spectrum of self-regulated learning, which includes (meta-) cognitive, motivational, and behavioural aspects (c.f., Ben-Eliyahu & Linnenbrink-Garcia, 2013).

Models of self-control may account for how self-regulated learning is influenced by ER strategies (Baumeister & Heatherton, 1996; Inzlicht & Schmeichel, 2012). Self-control is thought to be a deliberate, conscious, and effortful subset of self-regulation (Baumeister et al., 2007) that we consider to be a basic ability that students use to deliberately regulate their emotions and their learning. For instance, self-control will be needed to invest time and effort in learning, to persist on difficult or frustrating tasks (Baumeister, Bratslavsky, Muraven, & Tice, 1998), and to motivate oneself and resist distractions or temptations that might impair or interfere with learning (Leroy, Grégoire, Magen, Gross, & Mikolajczak, 2012; Magen & Gross, 2007). In line with self-control theory, Ben-Eliyahu and Bernacki (2015) conceptualize self-regulated learning as competing with co-occurring processes like emotion regulation for the finite capacity of self-control: Regulating emotions may reduce self-control resources to an extent that may harm subsequent self-regulated learning (‘ego depletion’) (c.f., Ben-Eliyahu & Linnenbrink-Garcia, 2015). We strive to identify forms of ER that demand few regulatory resources and may thus facilitate self-regulated learning. Tice et al. (2007) found that inducing positive emotions may counteract the depletion of self-control resources. After initial self-control depletion, positive affect that was induced by surprise gifts or humorous videos restored performance on a second self-control task (e.g., persistence on unsolvable puzzles or change in handgrip physical stamina). Based on Tice et al.'s (2007) findings it seems promising to examine whether positive emotions that

result from ER are also able to promote self-control resources and self-controlled behaviour. In particular, ER strategies that increase positive emotions may consume less self-control resources than ER strategies that focus solely on reducing negative emotion. Since ER effectiveness may vary across situations (Troy, Shallcross, & Mauss, 2013), it will be particularly important to investigate the self-control resource consumption of ER strategies in learning scenarios that are similar to real world self-regulated learning.

5.1.3. Contrasting Positive Reappraisal with Expressive Suppression

Affective, cognitive, and physiological effects. Two ER strategies received a great deal of attention in the scholarly literature, cognitive reappraisal, i.e., changing one's interpretation in a way that modifies the emotional response, and expressive suppression, which involves decreasing emotion-expressive behaviour (Gross, 1998b; 2002). Expressive suppression is known to decrease emotion expression but not negative emotional experience, and it was found to impair memory (Gross, 2002, 2015). Moreover, it increases sympathetic activation (e.g., increased cardiac reactivity and electrodermal responding). Recent examinations (Ben-Eliyahu & Linnenbrink-Garcia, 2013, 2015) found initial evidence that reappraisal may promote the experience of positive emotions and reduce negative emotions in academic contexts, and it seems to be positively related to the use of learning strategies. In contrast, suppression appears to reduce activated, but to increase deactivated positive emotions, and it was found to be associated with less use of learning strategies (Ben-Eliyahu & Linnenbrink-Garcia, 2013, 2015).

A particular variation of reappraisal that implies not only a reduction of the negative emotional response, but aims to change its quality is referred to as positive reappraisal (Schartau, Dalgleish, & Dunn, 2009; Shiota & Levenson, 2009, 2012). This ER strategy focuses on emphasizing the positive aspects and/or beneficial outcomes of a negative situation (Folkman & Moskowitz, 2000), and it is thought to facilitate the experience of positive emotions even when negative events and emotions are currently being experienced (Tugade & Fredrickson, 2004). Individuals engaged in positive reappraisal were able to maintain positive emotions in response to unpleasant films (Shiota & Levenson, 2012), and even to increase positive affective responses to negative pictures, recent stressful events, and past interpersonal offenses (McRae, Ciesielski, & Gross, 2012; Rood, Roelofs, Bögels, & Arntz, 2012; Witvliet, Knoll, Hinman, & DeYoung, 2010). In learning situations characterized by boredom, positive reappraisal helped individuals to maintain enthusiasm

and to increase their task performance (Leroy, Grégoire, Magen, Gross, & Mikolajczak, 2012), and it led to more positive, aroused affect and higher learning outcomes than expressive suppression or no regulation (Strain & D'Mello, 2015). Results on physiological consequences of positive reappraisal suggest that positive reappraisal may produce unique physiological effects that differ from other forms of reappraisal focussing on simple down-regulation of negative emotions (cf., McRae & Mauss, 2016), with positive reappraisal being related to increased cardiac reactivity (Shiota & Levenson, 2012) and smaller decreases in skin conductance (McRae et al., 2012). Studies that compare explicit positive reappraisal with expressive suppression found that positive reappraisers experienced more positive emotions than suppressors, but they revealed no effects on skin conductance or cardiovascular measures (Butler, Gross, & Barnard, 2014). Lohani and Isaacowitz (2014), however, found increases in skin conductance for both positive reappraisal and expressive suppression, whereas they observed no differences in mood. Based on the few existing findings, both positive reappraisal and expressive suppression may be associated with increases in physiological activation. The heterogeneous effects suggest that occurrence and nature of physiological effects might depend on the specific context which emphasizes the importance of additional research on physiological effects of the two ER strategies.

Consumption of self-control resources. So far, research on positive reappraisal concentrates on emotional implications. The instantaneous effect of this ER strategy on self-control resources received less attention. Nevertheless, the effects of detached reappraisal on self-control relative to expressive suppression offer information in this regard. Detached reappraisal refers to adopting an objective, neutral perspective by disengaging from all emotional implications of a situation implying a mere reduction of emotional responding (Shiota & Levenson, 2012). Results suggest that expressive suppression is more detrimental to self-control resources (cognitive ability, performance on the Stroop task) than detached reappraisal when reappraisal is instructed early, i.e., at the emotional situation onset (Johns, Inzlicht, & Schmader, 2008; Sheppes, Catran, & Meiran, 2009; Sheppes & Meiran, 2008). Positive reappraisal is assumed to rely to an even lesser degree on self-control resources than detached reappraisal, as it requires less redirecting of attention (Shiota & Levenson, 2009). Attention is not directed to unemotional aspects of the situation (as with detachment), but it is kept focused on emotional aspects whose meaning is reinterpreted. Expressive suppression, on the other hand, is thought to require constant self-monitoring and response inhibition, drawing heavily on self-control resources

(Richards & Gross, 1999). In line with this reasoning, learners who used positive reappraisal showed higher engagement and test performance than users of expressive suppression (Strain & D'Mello, 2015) as well as better performance in a memory test and were less tempted by distracting pictures or clips than learners who did not regulate their emotions (Leroy et al., 2012). Also, Ben-Eliyahu and Linnenbrink-Garcia (2015) found that reappraisal promoted the use of learning strategies while suppression reduced it. Taken together, there is initial evidence that positive reappraisal may demand less self-control resources than expressive suppression or 'no regulation' and that these resources may be harnessed for learning and boost learning efforts and outcomes.

5.1.4. Research Objectives and Hypotheses

The present study investigates the effects of explicit positive reappraisal on emotions and self-control resources. Further, it examines the link between positive emotions and the availability of self-control resources resulting from ER, and how these self-control resources influence self-regulated learning, thus evaluating the practical impact of positive ER on learning and achievement.

The study tested the following hypotheses:

1. Positive reappraisal leads to higher intensity of positive emotions and less depletion of self-control resources (i.e., higher availability of self-control resources) than expressive suppression. Both strategies are associated with increased physiological arousal.
2. The positive emotions induced by ER are positively associated with the availability of self-control resources.
3. The availability of self-control resources enhances subsequent self-regulated learning.

5.2. Method

5.2.1. Design

We contrasted two experimental groups that were instructed to use either positive reappraisal or expressive suppression to a control group (no regulation) in a mixed 3 (group) x 3 (time: baseline, post-film, post-learning) design for self-report measures. That is, self-report assessments were made prior to presenting an emotion-eliciting film clip on

animal testing (baseline), after the film clip (post-film), and after a learning period that followed the film clip (post-learning). In addition, psychophysiological indicators (heart rate, skin conductance) were recorded continuously during the emotion-inducing film clip, using a 3 (group) x 3 (time: baseline, film-1, film-2) design, with measurements before the film, in the first half, and in the second half of the film, respectively (see Figure 1 for an illustration).

5.2.2. Participants

Sixty-one students (45 female) at Technische Universität Darmstadt took part in the experiment. They were recruited by announcements on notice boards at the university's psychological institute and by personal contact. 58 participants were majoring in psychology, 45 were undergraduate students. Mean age was 24.3 years (*SD*=4.6; age range 20-43; $M_{\text{number of semesters}}$ = 4.89; *SD* = 3.68; range 2-13). Participants were compensated with a chance of winning one of several gift certificates. Males and females were proportionally assigned to the three groups, as previous research revealed gender differences in ER (McRae, Ochsner, Mauss, Gabrieli, & Gross, 2008). Apart from counterbalancing gender, participants were randomly assigned to the groups (21 to positive reappraisal and 20 each to expressive suppression and control). At the end of the experiment, participants were carefully debriefed by the experimenter who explained the purpose of the study and the deceptive nature of the knowledge test. Participants were asked whether their emotional state had returned to normal before they were dismissed (which was the case for all participants).

5.2.3. Materials and Procedure

After obtaining written informed consent, the experimenter prepared participants for psychophysiological assessment. Participants then rated their current positive and negative emotions and availability of self-control resources (baseline assessment). The procedure followed a dual-task-paradigm, which is traditionally used in ego depletion research (cf., Hagger et al., 2010).

Film task. Participants in the experimental groups were instructed to use either positive reappraisal or expressive suppression in order to regulate their emotions while watching a negative emotion-inducing film clip. Participants in the positive reappraisal group were instructed to focus on positive aspects of the film (instruction based on

research involving explicit positive reappraisal; Schartau et al., 2009; Shiota & Levenson, 2009, 2012). The expressive suppression group was instructed to disguise their emotions (instruction adapted from Richards & Gross, 2000). The control group was asked to refrain from ER during the film (instruction adapted from Vohs & Schmeichel, 2003) in order to prevent spontaneous ER attempts and to ensure the comparability of the groups. Instructions (see Appendix A) were equal in length and presented before the film started. The negative emotion-inducing clip showed the first 5:31 minutes of a campaign against animal testing (Animal Aid, 2011).

After the film (post-film assessment), participants again rated their current emotions and availability of self-control resources, in addition to the subjective effectiveness of the ER instructions. As parts of the self-regulated learning measure, rating of self-efficacy for the learning task and intended learning time were also assessed.

Learning task. Participants worked on a task that required self-regulation of learning behaviour. The task was dissimilar to the film task which required the participants to regulate their emotions. Participants prepared for a pretend short knowledge test about a subject unrelated to the film (duration 15 min). The knowledge test was announced in order to motivate participants to learn. The goal was to gain factual knowledge about the island of Malta (e.g., climate, language, geography). The learning material consisted of 7 sections (subtasks). Participants were provided with the opportunity to self-regulate their learning behaviour in quantitative and qualitative regard and were thus able to set their own learning goals and choose their own ways to attain them: To enable individual self-regulation of learning behaviour participants were free to choose their learning style, learning quantity (number of sections), and how much of the limited time they wanted to spend on learning. A variety of magazines was offered as distractors to enable procrastination behaviour. The resulting variations are measured as components of self-regulated learning (dependent variable).

Finally, participants reported their emotions and the availability of self-control resources for the third time. In addition, they were asked to rate their self-regulated learning behaviour (post-learning assessment). The total duration of the experiment was 40 minutes. All instructions were given in written form. Figure 1 illustrates the experimental procedure.

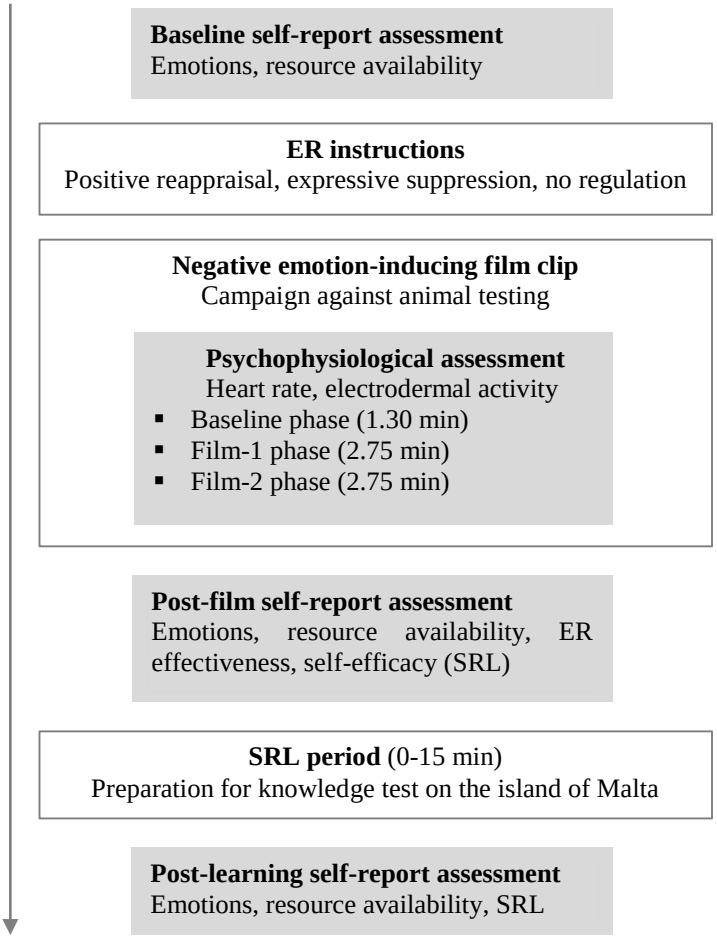

Figure 1. Sequence of tasks, self-report assessments and psychophysiological measurement; ER = emotion regulation; SRL = self-regulated learning.

5.2.4. Measures

Self-report. Subjective data were assessed using multi-item self-report scales. For the assessment of positive and negative emotions, we used an adjective list consisting of 16 emotions that were either likely to be elicited by the film-stimulus or related to the context of learning and achievement. Items were selected from the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988; upset, scared, ashamed, nervous, jittery, afraid; active, interested, excited, proud, determined), questionnaires used by Konrad (1997; secure, sad) and Knollmann (2006; disappointed), and research on academic emotions by Pekrun et al. (2002; bored, hopeful). The adjectives were to be rated on a

visual analogue scale ranging from *not at all* (0) to *very much* (21) ($\alpha_{positive\ emotions}$ = .62 - .86 [baseline - post-learning]; $\alpha_{negative\ emotions}$ = .73 - .82 [baseline – post-learning]).

Availability of self-control resources was measured with a self-developed short measure of self-control, a visual analogue scale ranging from *no energy* (0%) to *full energy* (100%) (0-21). The scale is a visual representation of item 21 ('My mental energy is running low') of the State Self-control Capacity Scale-Deutsch (SSCCS-D; Bertrams, Unger, & Dickhäuser, 2011), a German version of the State Self-Control-Scale (Ciarocco, Twenge, Muraven, & Tice, 2007). For the German scale, high reliability ($\alpha \geq .93$) and relations with validity criteria (e.g., anxiety, stress) were reported. Since the selected item shows the best item-total correlation (.79) within the scale, the level of mental energy is considered quintessential for the concept of self-control capacity. The one-item measure is thus considered to represent a parsimonious measure of the core idea of self-control.

Indicators of self-regulated learning were measured with items adapted from Schmitz and Wiese (2006) who reported satisfying split-half reliability and validity coefficients for these state-measures in longitudinal assessments (provided in parentheses). Ratings were mostly made on a 5-point scale ranging from *strongly disagree* (0) to *strongly agree* (4). The measures covered all learning phases and combined quantitative and qualitative indicators. As for the pre-action phase components, we assessed self-efficacy (post-film assessment; e.g., "Today, I can remain calm when facing learning difficulties because I can rely on my abilities."; 0-4; α = .71, r_{val} = .72) and motivation (high intrinsic, "I learned because I found the topic very interesting."; 0-4; r_{SH} = .88, r_{val} = .45; low extrinsic, "I learned because I want to do well on the test."; 0-4; r_{SH} = .94, r_{val} = .61). Regarding the action phase, we measured effort (e.g., "I made an effort when I was learning."; 0-4; α = .71) as an indicator of learning quality and effective learning time (in percent of time actually spent on learning; r_{SH} = .71) as an indicator of learning quantity. For the post-action phase we included the number of learned sections (0-7) as an objective, behavioural indicator of learning quantity, and satisfaction with the learning outcome ("Today, I am satisfied with my studying results."; 0-4; r_{SH} = .91) as an indicator of learning quality. Since we were looking for differences in self-regulated learning as a global construct, we calculated an overall score (mean). Due to different response formats, items were *z*-standardized.

To assess ER instruction effectiveness (manipulation check), participants rated difficulty ("I found it difficult to follow the instructions during the film.") and success ("I succeeded *making myself aware of positive aspects* (positive reappraisal group)*/not*

showing my emotions to the outside (expressive suppression group)*/allowing my emotions and not regulating them* (control group) during the film.") of the instructed ER strategies on a 5-point scale (0-4) as well as the proportion of successful instruction implementation ("Please estimate: For how many percent of the film duration you succeeded in *making myself aware of positive aspects* (positive reappraisal group)*/not showing my emotions to the outside* (expressive suppression group)*/allowing my emotions and not regulating them* (control group)?").

Psychophysiological measures. Self-report assessments of emotions were complemented by psychophysiological measures. Heart rate (beats per minute) and electrodermal activity (microSiemens) were measured continuously throughout the experiment using a portable VARIOPORT-B biosignal recording device (Becker Meditec, Karlsruhe, Germany). To measure electrodermal activity, two electrodes with NaCl conductance gel were placed 2 cm apart on the palmar surface of the fifth metacarpal bone of participant's nondominant hand. To assess heart rate, three Ag-AgCl disposable ECG snap electrodes were attached to the participant's chest, one on each end of the sternum and one on the left lower rib.

After artefact screening, we isolated a 'baseline' phase of 1.30 minutes before the start of the film task and a 'film' phase of 5.31 minutes. The 'film' phase was further divided into two sub phases (film-1, film-2), in order to reveal changes in physiological responding during emotion elicitation and regulation (see also Figure 1). Due to irregularities in marker-setting, we were unable to localize a learning phase and thus excluded these data from analyses. Two participants of the expressive suppression group were not included in the analyses on psychophysiological measures due to equipment malfunction.

5.3. Results

5.3.1. Manipulation Checks

Negative emotion induction. To examine whether the induction of negative emotions by means of the film stimulus was successful, we investigated changes in positive and negative emotions from baseline to post-film. To do so, we conducted a 3 (groups) x 2 (time) mixed-factors multivariate analysis of variance (MANOVA). The result indicated a multivariate main effect of time ($F(2,57) = 120.55$, $p < .001$, $\eta_p^2 = 0.81$). Positive and negative emotions significantly changed in the expected directions (see Table 2). Positive affect decreased from baseline to post-film ($F(1,58) = 112.73$, $p < .001$, $\eta_p^2 = 0.66$),

whereas negative affect increased ($F(1,58) = 211.45$, $p < .001$, $\eta_p^2 = 0.79$). The main effect of group ($F(4,116) = 0.17$, $p = .952$, $\eta_p^2 = 0.01$) as well as the interaction of time and group ($F(4,116) = 0.59$, $p = .672$, $\eta_p^2 = 0.02$) were not significant. Effect sizes are reported using partial eta squared (η_p^2; for analyses on self-report data) and generalized eta squared, respectively (η_G^2; for physiological data). According to Cohen (1988), these effect sizes are categorized as small ($\eta^2 > 0.01$), medium ($\eta^2 > 0.06$) and large ($\eta^2 > 0.13$).

Table 2

Mean (SD) Self-reported Emotions, Availability of Self-control Resources (N = 61) by Group across Assessments

	Measure		
Group	Positive emotions	Negative emotions	Resource availability
Positive reappraisal (*n*=21)			
Baseline	7.51 (1.48)	1.38 (1.56)	13.29 (5.01)
Post-film	5.22 (1.84)	6.65 (2.69)	11.52 (4.19)
Post-learning	7.15 (2.32)	1.96 (1.66)	12.52 (4.62)
Expressive suppression (*n*=20)			
Baseline	8.01 (1.87)	1.75 (1.35)	12.80 (3.61)
Post-film	4.92 (2.22)	6.75 (2.60)	8.95 (3.44)
Post-learning	7.74 (2.54)	1.85 (1.42)	13.45 (2.98)
No Regulation (*n*=20)			
Baseline	7.99 (1.97)	1.38 (1.04)	13.35 (4.33)
Post-film	5.36 (2.45)	6.63 (2.50)	10.75 (4.70)
Post-learning	7.51 (2.68)	2.09 (1.69)	14.00 (3.96)

Instruction effectiveness. Ratings of instruction difficulty and success were *z*-standardized and combined in a mean instruction effectiveness score ($\alpha = .86$), where high levels indicate high success and low difficulty. To compare the effectiveness of the ER instructions across the three groups, we conducted a one-way ANOVA, which revealed a main effect of group ($F(2,58) = 12.86$, $p < .001$, $\eta_p^2 = 0.31$). Multiple comparisons confirmed that instruction effectiveness in the positive reappraisal group ($M = -0.67$, $SD = 0.79$) was significantly lower than in the expressive suppression ($M = 0.37$, $SD = 0.80$, $p < .001$) and the control group ($M = 0.34$, $SD = 0.64$, $p < .001$). Participants in the positive

reappraisal group reported higher difficulties and lower subjective success of their efforts to reappraise the film contents as instructed. These group differences showed that responses to the instructions varied between participants. To account for these individual differences, the effectiveness of the instruction was included as a covariate in the following ANOVAs.

5.3.2. ER Effects on Emotions and the Availability of Self-control Resources

ER effects on resulting positive and negative emotions. To investigate differences in positive emotions after the emotion induction and regulation period (post-film), we included instruction effectiveness and baseline positive emotions as covariates in an ANCOVA, which yielded a non-significant main effect of group ($F(2,56) = 2.73$, $p = .074$, $\eta_p^2 = 0.09$), accompanied by significant main effects of both instruction effectiveness ($F(1,56) = 7.68$, $p = .008$, $\eta_p^2 = 0.12$) and baseline positive emotions ($F(1,56) = 17.38$, $p < .001$, $\eta_p^2 = 0.24$). Simple contrasts showed, as hypothesized, that participants in the positive reappraisal group experienced significantly more positive emotions than participants in the expressive suppression group ($p = .024$). The difference between the positive reappraisal group and the control group was not significant ($p = .117$). Concerning negative emotions, we again conducted an ANCOVA controlling for instruction effectiveness and baseline negative emotions. The pattern was converse; however, neither the effect of group ($F(2,56) = 0.37$, $p = .690$, $\eta_p^2 = 0.01$), nor the main effects of instruction effectiveness ($F(1,56) = 2.49$, $p = .120$) and baseline negative emotions ($F(1,56) = 1.42$, $p = .239$) were significant. Figure 2 depicts these group differences in emotions (covariate-adjusted means) after the ER task.

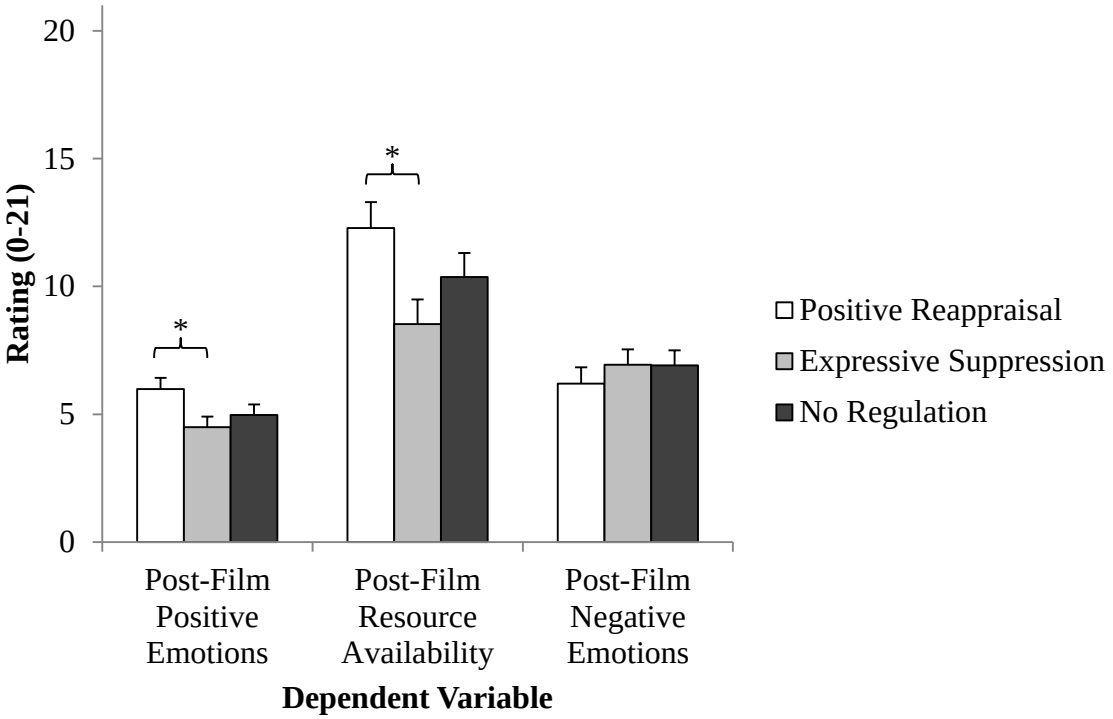

Figure 2. Covariate-adjusted estimated means and standard errors for post-film ratings of positive emotions, availability of self-control resources, and negative emotions by group. Error bars represent standard errors. * Indicates a significant difference between groups at $p = .05$.

ER effects on the availability of self-control resources. An ANCOVA on post-film availability of self-control resources, which also accounted for instruction effectiveness, revealed a main effect of group ($F(2,57) = 3.26$, $p = .046$, $\eta_p^2 = 0.10$) and no main effect of instruction effectiveness ($F(1,57) = 2.48$, $p = .121$). In line with our hypotheses, simple contrasts confirmed that participants in the positive reappraisal group had more self-control resources available after ER than the expressive suppression group ($p = .014$). The difference between the positive reappraisal group and the control group was not significant ($p = .198$). Mean scores of availability of self-control resources for the three groups are illustrated in Figure 2.

ER effects on heart rate and skin conductance. Average phase values of heart rate and skin conductance are presented in Table 3. To examine the changes in heart rate over time across the three groups, we conducted a 3 (groups) x 3 (phases) mixed-factors ANOVA. The analysis showed a main effect of phase ($F(2,112) = 36.87$, $p < .001$, $\eta_G^2 = 0.03$) but no main effect of group ($F(2,56) = 1.85$, $p = .166$) and no interaction ($F(4,112) =$

0.54, p = .706). Paired t-tests indicated that heart rate decreased from baseline to film-1 in all groups ($t(58)$ = -8.52, p < .001), whereas the increase from film-1 to film-2 failed to reach significance ($t(58)$ = 1.89, p =.063). In addition, we conducted a 3 (groups) x 2 (phases) mixed-factors ANOVA that accounted only for the film-phases, in order to focus on changes during the ER period. As already indicated by the reported t-tests, the main effect of phase did not reach significance ($F(1,56)$ = 3.57, p = .064, η_G^2 = 0.00). The main effect of group ($F(2,56)$ = 1.67, p = .197) and the interaction ($F(2,56)$ = 0.88, p = .422) were nonsignificant.

Table 3

Mean (SD) Heart Rate and Electrodermal Activity (N = 61) by Group across Assessment Phases

	Measure	
Group	Heart rate (bpm)	Electrodermal activity (µS)
Positive reappraisal (n=21)		
Baseline	82.10 (12.04)	2.77 (.64)
Film-1	78.00 (11.86)	2.84 (.71)
Film-2	79.08 (11.47)	2.97 (.66)
Expressive suppression (n=20)		
Baseline	87.88 (10.16)	2.68 (.73)
Film-1	82.71 (10.91)	2.83 (.76)
Film-2	83.95 (10.88)	2.79 (.85)
No regulation (n=20)		
Baseline	80.19 (13.59)	2.41 (.84)
Film-1	76.70 (11.60)	2.52 (.86)
Film-2	76.72 (12.37)	2.51 (.91)

Note. bpm = beats per minute; µS = microsiemens; film-1 = first half of the emotion-inducing film (min 0.00-2.45); film-2 = second half of the emotion-inducing film (min 2.45-5.31).

We also computed a 3 (groups) x 3 (phases) mixed-factors ANOVA for skin conductance, which yielded a main effect of phase ($F(2,112)$ = 9.16, p < .001, η_G^2 = 0.01)

but no interaction ($F(4,112) = 1.21$, $p = .309$, $\eta_G^2 = 0.00$) and no main effect of group ($F(2,56) = 1.38$, $p = .259$, $\eta_G^2 = 0.05$). Paired *t*-tests showed that skin conductance increased from baseline to film-1 ($t(58) = 3.73$, $p < .001$) but did not change during the film ($t(58) = 1.17$, $p = .245$). Film-2 skin conductance was still significantly higher than at baseline ($t(58) = 3.21$, $p = .002$). Despite the lack of a main effect of group, two-sample *t*-tests comparing the three groups' skin conductance indicated significantly lower values for controls than positive reappraisers ($t(115) = -3.02$, $p = .003$). The difference between the control group and the expressive suppression group was only marginally significant ($t(109) = -1.93$, $p = .057$). The two regulation groups were not substantially different ($t(112) = .97$, $p = .334$).

An additional 3 (groups) x 2 (phases) mixed-factors ANOVA comparing only the two film subphases revealed a significant interaction of group and phase ($F(2, 56) = 3.73$, $p = .030$, $\eta_G^2 = 0.002$), whereas the main effects were nonsignificant ($F_{phase}(1,56) = 1.51$, $p_{phase} = .225$; $F_{group}(2,56) = 1.35$, $p_{group} = .267$). Paired *t*-tests run separately for each group showed that positive reappraisers' skin conductance increased from film-1 to film-2 ($t(20) = 2.87$, $p = .009$), whereas expressive suppressors ($t(17) = -0.58$, $p = .568$) and controls ($t(19) = -0.22$, $p = .827$) showed no significant changes. Mean changes in skin conductance and heart rate level over time for the three groups are illustrated in Figure 3.

Summing up the results on physiology, heart rate decelerated at the very onset of the ER period and stayed low during ER. The groups did not differ significantly in their average heart rate and heart rate processes. In contrast, an increase of skin conductance was observed with the onset of ER. Interestingly, positive reappraisers showed higher overall levels of skin conductance, as compared to the control group, and skin conductance increased even further during the ER period in positive reappraisers, whereas the level of skin conductance remained unchanged in the two other groups.

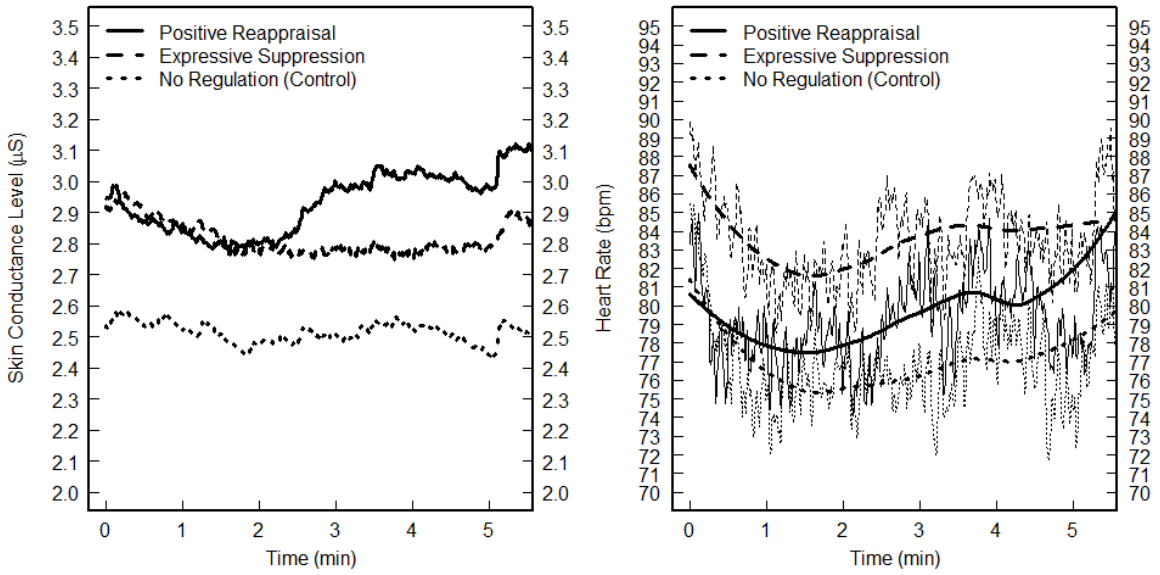

Figure 3. Average heart rate and electrodermal activity (EDA) as a function of emotion regulation group.

5.3.3. Predicting Availability of Self-control Resources by Positive Emotions

A linear regression analysis was performed in order to examine whether the intensity of post-film positive emotions was predictive of the availability of self-control resources at that time. The more positive emotions were experienced, the more self-control resources were available (β = .47, p < .001, R^2 = .22).

In order to check whether the association of positive emotions with self-control resources was possibly moderated by ER group, an additional hierarchical multiple regression analysis tested for group differences with respect to the slope and intercept for this prediction of availability of self-control resources. It accounted for two dummy-coded variables that contrasted the positive reappraisal group with the two other groups as moderators, as well as post-film positive emotions, and the interaction terms as predictors. When the interaction terms were entered, post-film positive emotions was the only significant predictor of availability of self-control resources ($\beta_{\text{self-control}}$ = .68, p = .005; R^2 = .30, F(5,55) = 4.61, p = .001). This result indicates that increasing the intensity of positive emotions went along with a gain in available self-control resources and that the strength of this association was similar in the suppression and the positive reappraisal group.

Similarly, a linear regression of post-film availability of self-control resources on post-film negative emotions was conducted, which revealed that that availability of self-control

resources declined with more negative emotions (β = -.42, p = .001, R^2 = .18). Again, we tested for group differences in slope and intercept using a hierarchical multiple regression analysis. When the interaction terms were included (R^2 = .32, F(5,55) = 5.25, p = .001), post-film negative emotions lost its predictive power (β = -.12, p = .528). Instead, the 'no regulation' dummy (β = .77, p = .035) and one interaction term (Dummy 'no regulation' x post-film negative emotions; β = -.94, p = .013) predicted post-film availability of self-control resources. This indicates that, when the intensity of negative emotions was zero, self-control resources were higher in the control group (b = 19.66, 95% CI: [15.08, 24.24]) than in the positive reappraisal group (b = 12.79, 95% CI: [7.49, 18.10]). Moreover, the slope of the decline in post-film availability of self-control resources as negative emotions increase differed significantly between the two groups ($b_{\text{positive reappraisal}}$ = -0.19, 95% CI: [-0.93, 0.55]; b_{control} = -1.34; 95% CI: [-1.99, -0.70]): With stronger negative emotions, the positive reappraisal group showed a lesser decline in the availability of self-control resources than the control group.

In summary, as expected, positive emotions predicted the availability of self-control resources without a moderating effect of ER group. Conversely, we found a negative association of negative emotions and availability of self-control resources. When no negative emotions were experienced, the control group had more self-control resources available than the positive reappraisal group. However, with increasing negative emotions, the positive reappraisal group experienced smaller self-control losses than the control group.

5.3.4. Impact of Availability of Self-control Resources on Self-regulated Learning

In order to test whether the amount of self-control resources that was available after the film task had an impact on subsequent self-regulated learning, we conducted a linear regression analysis. It revealed that post-film availability of self-control resources was a positive predictor of overall self-regulated learning (β = .30, p = .017, R^2 = .09). The higher participants' availability of self-control resources was after having regulated their negative emotions, the higher their self-regulated learning overall score. This result is in line with our hypothesis that self-regulatory learning activities substantially depend on the current availability of self-control resources. Average overall scores of self-regulated learning for the groups are shown in Table 4; supplementary component scores can be found in Table 4.

To reveal group differences in both the intercept and slope for the prediction of the self-regulated learning overall score, we performed a hierarchical multiple regression analysis that included the dummy-coded variables described in the previous section, z-standardized post-film availability of self-control resources, and the interaction terms as predictors. When the interaction terms were included, the overall regression approached significance (R^2 = .16, F(5,55) = 2.12, p = .077). Availability of self-control resources was no longer a significant predictor (β = .03, p = .885); however, one interaction term (Dummy 'no regulation' x Resource Availability) approached significance (β = .34, p = .067). This indicates that the slope that predicts self-regulated learning as availability of self-control resources increases differed to a certain extent between the positive reappraisal and the control group. In the control group, a gain in availability of self-control resources was associated with an increase in self-regulated learning (b = 0.06, 95% CI: [0.01, 0.11]) whereas for the positive reappraisal group, the increase in self-regulated learning was almost non-existent (b = 0.00, 95% CI: [-0.03, 0.04]).

In order to confirm our assumption that availability of self-control resources can account for effects on self-regulated learning although being correlated with positive emotions we additionally checked whether there was an indirect effect of positive emotions on self-regulated learning through availability of self-control resources. To estimate the indirect effect we used nonparametric bootstrapping analyses (Preacher & Hayes, 2004) with a 95% bias corrected confidence interval (CI) based on 5000 bootstrapped samples. The CI (b = 0.02, 95% CI: [0.0008, 0.0578]) did not include zero and thus indicated a significant indirect effect. In the model, positive emotions predicted availability of self-control resources (b = 0.92, standard error (SE) = 0.23, p < .001). The initial total effect of positive emotions on self-regulated learning (b = 0.06, SE = 0.03, p = .033) was reduced to a non-significant direct effect after including availability of self-control resources in the regression equation (b = 0.04, SE = 0.03, p = .238). However, availability of self-control resources also no longer predicted self-regulated learning (b = 0.02, SE = 0.15, p = .114). According to Hayes (2009), nonsignificance of individual paths in a mediation model is not crucial to whether the indirect effect is significant. Thus, given the significant indirect effect, these results are consistent with the claim that positive emotions increase the availability of self-control resources, which in turn promotes self-regulated learning.

Table 4

Mean (SD) Scores of Components and Overall Scores of Self-regulated Learning by Group

	Group		
	Positive reappraisal	Expressive suppression	No Regulation
Measure	(*n* = 21)	(*n* = 20)	(*n* = 20)
SE	2.67 (.42)	2.50 (.68)	2.37 (.71)
EF	3.00 (.78)	2.80 (.83)	2.75 (.97)
IM	2.62 (.87)	2.45 (1.10)	2.60 (.82)
EM	2.71 (1.06)	2.95 (.95)	2.65 (.93)
OU	4.38 (1.88)	3.85 (1.93)	4.05 (1.79)
ELT	83.38 (12.60)	86.75 (12.90)	82.40 (17.18)
SO	2.62 (.92)	2.65 (.81)	2.55 (.95)
SRL	.09 (.33)	-.04 (.46)	-.06 (.57)

Note. SE = self-efficacy (0-4); EF = effort (0-4); IM = intrinsic motivation (0-4); EM = extrinsic motivation (0-4); OU = outcome (number of completed subtasks; 0-7); ELT = effective learning time (in percent of total learning time; 0%-100%); SO = satisfaction with outcome (0-4); SRL = self-regulated learning overall score (z-standardized mean).

5.4. Discussion

The present study aimed to examine the effectiveness of two strategies to regulate negative emotion – positive reappraisal and expressive suppression – with respect to the experienced emotions, physiological arousal, and consumption of self-control resources. We were particularly interested in the relevance of positive emotions for the availability of self-control resources. To broaden our understanding of the educational relevance of ER in consideration of self-control resources, the study further illuminated the impact of post-emotion regulation availability of self-control resources on subsequent self-regulated learning.

The study demonstrates that positive reappraisal and expressive suppression differ substantially in their effectiveness. It also confirms both the association of positive emotional experience with self-control resources and the relevance of available self-control resources for self-regulated learning efforts.

5.4.1. Positive Reappraisal's Affective, Self-control, and Physiological Outcomes

The results confirmed our prediction that the positive reappraisal group would experience more positive emotions after ER than the expressive suppression group. The two strategies did not lead to different intensities of negative emotions though. The observed psychophysiological data indicate that positive reappraisal was associated with higher physiological arousal than expressive suppression. At the onset of the ER period, heart rate decreased and skin conductance increased regardless of the ER strategy. However, over the ER period, skin conductance in the reappraisal group was higher than in the control group and increased during the course of the film. In line with our predictions, the positive reappraisal group had more self-control resources available after ER than the expressive suppression group.

The results suggest that even when negative emotions are present and of equal intensity, positive reappraisal will be more likely to enhance positive emotions than expressive suppression. This finding adds evidence to the emerging body of research showing that positive reappraisal has a beneficial short-term effect on emotional experience (Ben-Eliyahu & Linnenbrink-Garcia, 2013; Butler et al., 2014; Leroy et al., 2012; McRae et al., 2012; Rood et al., 2012; Strain & D'Mello, 2015; Witvliet et al., 2010), and it supplements previous findings on the effectiveness of ER strategies that have not yet specified the effectiveness of explicit positive reappraisal (Webb, Miles, & Sheeran, 2012). Moreover, the results lend support to the idea that positive reappraisal is less costly with regard to self-control resources than expressive suppression, broadening existing knowledge on differential reappraisal effects on self-control resources that has mostly focused on detached reappraisal. The present evidence is in line with previous findings of lower consumption of self-control resources for positive reappraisal as compared with suppression (Ben-Eliyahu & Linnenbrink-Garcia, 2015; Johns et al., 2008; Leroy et al., 2012; Sheppes et al., 2009; Sheppes & Meiran, 2008; Strain & D'Mello, 2015). It is also compatible with the idea that suppressing emotions does not adjust an emotion and requires learners to constantly monitor themselves and inhibit their emotional responses (Richards & Gross, 1999), thus taxing self-control resources more than the antecedent-focused strategy of reappraisal which adjusts emotion generation at an earlier stage.

Interestingly, during the ER period, positive reappraisal further enhanced skin

conductance. In McRae et al.'s (2012) study, positive reappraisal reduced skin conductance but was less effective than reappraisal that focused on decreasing negative affect. The authors proposed that increasing positive emotions in the face of negative stimuli involves a qualitative shift in valence transforming arousing negative affect to arousing positive affect, whereas decreasing negative affect involves a quantitative reduction of emotional experience and arousal. Although our results are not entirely congruent with those of McRae et al. (2012), they both suggest that positive reappraisal is associated with higher electrodermal activity than strategies that aim to simply reduce negative emotions. Our findings are also compatible with the association of more activated positive emotions with reappraisal in contrast to more deactivated positive emotions observed with suppression found by Ben-Eliyahu and Linnenbrink-Garcia (2013). They add to the growing body of evidence suggesting that positive reappraisal is linked to higher levels of physiological activation (McRae et al., 2012; McRae & Mauss, 2016; Shiota & Levenson, 2012) which can potentially be used to take action towards (learning) goals or to improve negative situations.

The trajectory of an initial increase in skin conductance and decrease in heart rate across all groups may be due to the specific emotions evoked by the film: Participants reported high levels of fright, anger, sadness, and shame and may also have experienced other negative emotions. Since the groups did not differ with respect to negative emotions we also have to consider whether positive and negative emotions were experienced simultaneously (‘mixed emotions’; Larsen & McGraw, 2011). Research on distress and coping (which is related to ER; for details see Gross, 2015) shows that positive affect does co-occur with negative affect under conditions of stress (Folkman & Moskowitz, 2000). Remarkably, heart rate remained comparably low in all conditions, even in the positive reappraisal group. The positive reappraisal group may have experienced feelings of affection, which is a positive emotion that is associated with increased skin conductance and decreased heart rate (Kreibig, 2010). It seems possible that the positive reappraisal instruction which offered a perspective focusing on beneficial outcomes did elicit such feelings of affection or sympathy. In the positive reappraisal condition, negative feelings and positive feelings (like affection) may have been experienced at the same time causing the psychophysiological profile of decreased heart rate and increased electrodermal activity.

Based on the present data, positive reappraisal appears to be a more effective strategy than expressive suppression that leads to more positive affective outcomes, is associated

with enhanced arousal, and is less resource-depleting. This result needs to be confirmed by future research.

5.4.2. Positive Emotions Were Crucial for the Availability of Self-control Resources

The second major question was whether the occurrence of positive emotions is crucial for the availability of self-control resources. As expected, the intensity of positive emotions resulting after the ER period was positively related to the amount of self-control resources available at that time. This association was independent of how negative emotions had been regulated previously. Negative emotions, on the other hand, were negatively related to availability of self-control resources; but this relationship varied as a function of prior ER: When no negative emotions were experienced, the control group was less resource-depleted than the positive reappraisal group, suggesting that self-control resources were expended in the course of prior emotion regulatory efforts. Yet, with stronger negative emotions, the control group suffered a higher loss of self-control resources than the positive reappraisal group. This result underpins the notion that, as we argued in the previous section, even and especially in the presence of negative emotions, positive reappraisal has a beneficial influence.

The results support the idea that positive emotions generally aid self-control resources and they are compatible with the studies of Tice et al. (2007) who found that experimentally induced positive emotions restored the capacity to exert self-control. In terms of the resource-promoting capability of positive emotions, it appears to be irrelevant whether ER was used and which specific strategy was employed to elicit them. The results indicate that positive emotions can act as a means to enhance self-control resources, which in turn are available for various activities that require self-control. Promoting positive emotions by using positive-oriented ER and thus facilitating self-regulation may, therefore, have additional desirable short-term consequences that are associated with high self-control, e.g., intellectual performance (Schmeichel, Vohs, & Baumeister, 2003) and task persistence (Tice et al., 2007).

5.4.3. Self-control Availability was Positively Related to Self-regulated Learning

The third question addressed by this study investigated whether the amount of self-control

resources available after previous ER is predictive of the success of subsequent acts of self-regulated learning. As expected, availability of self-control resources promoted self-regulated learning. Moreover, the existence of an indirect effect of positive emotions on self-regulated learning through availability of self-control resources supported our assumption that the association of availability of self-control resources and self-regulated learning was not driven by positive emotions. These results are in line with the idea that self-control resources are needed for the self-regulation of learning (Ben-Eliyahu & Bernacki, 2015; Ben-Eliyahu & Linnenbrink-Garcia, 2015), which includes motivational, meta-cognitive, and behavioural features such as self-efficacy, goal setting, and learning outcomes. Thus, concurrent behavioural, cognitive, and emotional processes that also draw on self-control resources need to be considered when self-regulated learning is investigated (Ben-Eliyahu & Bernacki, 2015), especially when it comes to real-world learning. This includes (ER) processes directly associated with the learning situation but also other processes like distracting events and thoughts or temptations (cf., Leroy et al., 2012) that may interfere with learning.

A further differentiation of this effect appears noteworthy. Interestingly, the magnitude of the effect of the availability of self-control resources on subsequent self-regulated learning tended to vary according to the previously used ER strategy. The results indicated that the self-regulated learning behaviour of positive reappraisers was unrelated to the amount of self-control resources they had at their disposal. However, when emotions had not been regulated before, self-regulated learning differed with the availability of self-control resources. Hence, by reducing the importance of self-control resources for self-regulated learning, positive reappraisal may offer the potential to wipe out negative aftereffects of ego depletion that are present in unregulated emotions. This conclusion may have two implications: When self-control resources are low, positive reappraisal may lead to over-expenditure of self-control resources, whereas it may promote under-expenditure when self-control resources are high. While over-expenditure is assumed to be associated with long-term costs, it can be helpful in certain learning and achievement situations when high performance is needed for a short period of time (e.g., in the face of deadlines or in test situations). Thus, ER might have a compensating function for learning and achievement: In the face of depleted self-control resources, focusing on the positive aspects of a situation can help one to maintain self-regulated behaviours and, thus, may foster self-discipline.

5.4.4. Limitations and Suggestions for Future Research

The present study has some limitations that should be considered and may be used to direct future research. First, the relatively small sample size with a majority of female psychology students is not ideal. In the present study, the statistical power of the first statistical test (ANCOVA examining ER effects on positive emotions; $\alpha = .05$) was .56. Future studies should ensure equal examination of males and females, a more diverse sample, and, most importantly, a larger sample size that allows for a power of .80 or more to strengthen the results. Second, since participants were informed about the film to elicit negative emotions and about the subsequent learning task beforehand, they may have formed hypotheses about how emotions may affect learning. This could be particularly true for the psychology students who represented the majority of the sample. However, a bias due to demand characteristics seems unlikely as our hypotheses refer to the specific effects of ER (rather than emotions in general). Third, there were some measurement issues. Availability of self-control resources was measured only by self-report and with a single-item. Multi-item measures (e.g., the full German State Self-control Capacity Scale; Bertrams et al., 2011) as well as additional behavioural measures of self-control (e.g., the Stroop task; c.f., Sheppes & Meiran, 2008) or procedures that contrast active versus passive responding (cf., Baumeister et al., 1998) should be included in future studies. In order to confirm the factor structure of multi-component concepts like self-regulated learning, it is recommended to consistently use at least four indicators/items per factor (c.f., Marsh et al., 1998). Finally, the positive reappraisal instruction was rated as more difficult to implement and less successful than the other instructions. Since a higher number of attempts to regulate emotions is associated with higher ER effectiveness (Webb et al., 2012), study designs that involve a training of positive reappraisal (cf., Kim & Hodges, 2011; Schartau et al., 2009) could provide further insights.

Future studies may compare within-strategy variations (cf., McRae et al., 2012) that differ solely with respect to the goal of promoting positive emotions to attribute the effects of an ER strategy more clearly to its capability to increase positive emotions and its self-control demands. To gain more knowledge on the potential of positive reappraisal and other positive-oriented strategies, a promising approach could be to investigate varying degrees of strategy practice. Care should be taken to address possible timing effects. More frequent assessments could reveal possible changes in between assessments. Moreover, medium and longer term consequences of ER strategy use might be different from the short

term effects examined in laboratory studies.

5.4.5. Conclusions

How learners regulate their emotions may be important in all kinds of academic and non-academic learning situations that require self-regulation. Since research on positive reappraisal is scarce, this study provides valuable information about the functioning and corollaries of this strategy by highlighting its beneficial consequences for emotions and self-control resources, which in turn were supportive of self-regulated learning. Enhancing positive-oriented ER might be a key component in fostering self-regulation and academic success. Further evidence is needed to determine whether positive reappraisal should be encouraged by teachers and educators. Methods to enhance positive ER (for a review of short-term and long-term positive ER interventions see Quoidbach & Gross, 2015) may for example be instruction or training programs implemented in schools or higher educational institutions (Denny & Ochsner, 2014; Macklem, 2008, 2011; Pincus & Friedman, 2004; Weytens, Luminet, Verhofstadt, & Mikolajczak, 2014), adaptations of clinical/therapeutic interventions such as cognitive bias modification (Schartau et al., 2009; Woud, Holmes, Postma, Dalgleish, & Mackintosh, 2012) or the use of special media (e.g., intelligent tutoring systems; Strain, Mello, & Graesser, 2011). Little is known about the properties of positive reappraisal in the school setting, homework situations, and when learning is focused on long term goals. Another challenge will be to identify expedient positive appraisals that do not distract learners but motivate them and keep their attention focused on the learning task.

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5.7. Appendix A

ER instructions

Positive Reappraisal [instructions translated from German]:

> For our study, it is extremely important that you make yourself aware of positive aspects. Please keep in mind that, due to the public pressure exerted by such campaigns, more and more companies, institutes, and universities switch to more efficient and reliable animal-free test methods, so many animals will be untroubled by tests in the future.

Expressive Suppression:

> For our study, it is extremely important that you do not let show the emotions you experience during the film. Make absolutely sure you do not show your inner feelings to the outside. Please behave in a way that an observer would not know you are feeling anything at all.

No Regulation:

> For our study, it is extremely important that you entirely allow the emotions you experience during the film. Allow yourself to perceive and experience these emotions. We ask you to regulate them in no way. Give ‘free rein’ to your emotions inwardly and outwardly.

6. Manuscript B

Reappraisal of failure feedback: Consequences for affect, perceived self-control resources, and working memory capacity

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Highlights

- Failure feedback is reappraised more positively (P+) or less negatively (N-).
- P+ restores positive affect while N- does not.
- Positive affect generally promotes self-control resources.
- Higher self-control level improves the working memory capacity of N- users.
- Self-control level and affect interact regarding P+ users' working memory capacity.

Abstract

Emotion regulation via cognitive reappraisal is known for its cognitive advantages but has hardly been examined in academic contexts. The present study compares short-term effects of reappraisal tactics involving a more positive (P+) or less negative perspective (N-) on affect, perceived self-control, and working memory capacity. Participants (N = 118) were instructed to adopt P+ or N- tactics to modify negative emotions elicited by failure feedback (control groups received no feedback/no tactic instruction). In contrast to N-, the P+ tactic enabled participants to effectively restore positive affect. Positive affect was generally linked to higher perceived self-control capacity. When participants engaged in P+ reappraisal, performance in a subsequent working memory test was affected by both self-control capacity and affective state. Our findings suggest affective benefits of P+ over N- tactics. However, both tactics may help or hurt cognitive performance depending on individual self-control and may thus become relevant to academic success.

Keywords: emotion regulation; perceived self-control capacity; positive reappraisal; working memory capacity

6.1. Introduction

Emotions have a significant impact on scholastic learning and achievement (e.g., Pekrun, Frenzel, Goetz, & Perry, 2007). While the influence of negative emotions was found to be rather detrimental, beneficial effects were observed with positive emotions (Pekrun et al., 2002a). Effectively regulating negative emotions resulting from events such as failure feedback may thus have desirable effects on academic success. Emotion regulation (ER; Gross, 1998b) refers to adjusting the quality of an emotion, the time of its occurrence, and the way it is experienced and expressed. The ER strategy of cognitive reappraisal is known to effectively reduce negative emotions and have favorable effects on cognition (Gross, 2015). Tactics of cognitive reappraisal may not only be used to down-regulate negative emotions ("N- reappraisal"), but also to up-regulate positive emotions ("positive reappraisal"; now referred to as "P+ reappraisal"). P+ reappraisal refers to focusing on positive aspects or beneficial outcomes of a negative event (Folkman & Moskowitz, 2000) and is assumed to promote positive emotions even in negative situations (Tugade & Fredrickson, 2004). As positive emotions were shown to enhance learning and achievement, this tactic may be particularly appropriate in the context of academic failure feedback. According to pertinent models of self-control (Baumeister & Heatherton, 1996; Inzlicht & Schmeichel, 2012), ER processes are thought to impair the cognitive processes relevant to academic achievement. However, it appears to depend on the particular ER strategy whether and to what extent cognitive performance will be depleted (Johns et al., 2008). As positive emotions seem to replenish self-control capacity (Tice, Baumeister, Shmueli, & Muraven, 2007), P+ reappraisal may draw less on self-control capacity than N-reappraisal. The additional resources may be reflected in enhanced cognitive capacity.

In an academic context, outcomes of P+ reappraisal have hardly been examined to date. The effectiveness of P+ reappraisal of failure feedback as well as its superiority to N-reappraisal are still to be confirmed. The present study aims to examine effects of P+ and N- reappraisal on (a) emotional experience, (b) perceived self-control capacity, and (c) cognitive resources.

6.1.1. Emotions and Their Regulation in Scholastic Learning and Achievement

Due to the importance of academic learning and achievement for educational and

professional careers, students may experience a variety of emotions in academic contexts ranging from hope for good grades to shame for failure ("academic emotions"; Pekrun et al., 2002). In general, positive emotions are known to enhance motivation, cognitive resources, the use of metacognitive learning strategies, and overall academic achievement, whereas negative emotions seem to have adverse effects on these variables (Pekrun et al., 2002a). When negative emotions (e.g., disappointment, shame, or sadness) occur as a reaction to failure feedback (e.g., Nummenmaa & Niemi, 2004), effective regulation of these emotions should promote motivation, cognition, and learning, and consequently assist future academic success. A large body of literature on the ER strategy of cognitive reappraisal, i.e. changing one's evaluation of an emotion-relevant event in a way that alters the emotional response (Gross & Thompson, 2007), suggests that it may be a particularly effective ER strategy. that reduces experience and expression of the emotion and improves memory (for a review see Gross, 2015). McRae, Ciesielski, and Gross (2012) distinguished between emotional goals (what one is trying to attain; e.g., reduce negative affect) and tactics (what one actually thinks) of cognitive reappraisal. Individuals were found to sometimes pursue instrumental goals (Tamir, 2009) that involve decreasing positive or increasing negative emotions (i.e., when they expect negative emotions (e.g., worries) to be more useful in a particular situation (e.g., a test) and with a specific motivation (e.g., to avoid threats). To attain an emotional goal, individuals may (simultaneously) use various reappraisal tactics like detachment, acceptance, or P+ reappraisal. Research mostly focused on reappraisal tactics aiming at decreasing negative emotions (e.g., Gross, 1998a; Ray, Wilhelm, & Gross, 2008). Only lately, a few studies have addressed short-term effects of P+ reappraisal on emotional responding. The results show that it allows individuals to maintain positive affect (Shiota & Levenson, 2012) in response to unpleasant films and to increase positive emotional responding to stressful events and interpersonal offenses (Rood et al., 2012; Witvliet et al., 2010). Individuals who freely chose a reappraisal tactic in response to negative pictures used the P+ tactic more frequently and responded more positively when they were instructed to strive for the goal of increasing positive emotions, as compared to the aim of decreasing negative emotions (McRae et al., 2012).

6.1.2. P+ Reappraisal and Academic Achievement

While the influence of emotions on learning and achievement was investigated thoroughly, the ER effects and their underlying processes received less attention. As for the effects of P+ reappraisal, there is initial evidence for its benefits for learning and achievement: When

working on boring tasks, learners who were instructed to use P+ reappraisal of the situation managed to maintain their enthusiasm and increase their task performance (Leroy et al., 2012), reported more positive, aroused affect, and performed better in a knowledge test (Strain & D'Mello, 2015), as compared to 'no regulation' control conditions. Since boredom is generally thought to involve relatively low levels of negative valence (cf., Goetz & Hall, 2014) it remains to be examined whether P+ reappraisal is also effective with more intense negative emotions (like when negative feedback is received), and how it compares not only to unregulated emotions but also to N- reappraisal tactics. Moreover, as P+ reappraisal is a cognitively-based ER tactic, P+ and N- reappraisal tactics might act differently on the cognitive resources required for academic success.

6.1.3. Influence of P+ Reappraisal on Cognitive and Perceived Self-control Resources

Working memory is considered a basic cognitive resource needed to acquire new knowledge and skills, and to perform intellectual tasks (cf., Dehn, 2008; Pickering, 2006) thus representing a very important factor in academic contexts. In Baddeley's (2012) influential model, working memory is a multi-component system incorporating short-term memory subsystems and a central executive which coordinates cognitive processes and directs attention. Executive processes are involved whenever multiple pieces of information are to be held and processed in working memory simultaneously (e.g., in the case of dual-task interference; cf., Dehn, 2008). They are thought to be primarily reflected by working memory capacity which was associated with a variety of cognitive abilities in academic situations like reading comprehension (e.g., Barrett, Tugade, & Engle, 2004) or performance in academic tests (e.g., Alloway & Alloway, 2010; Gathercole, Pickering, Knight, & Stegmann, 2004). To identify the effects of different reappraisal tactics in an educational context, it is thus crucial to describe and understand their influence on working memory capacity. Models of self-control (e.g., Baumeister & Heatherton, 1996; Inzlicht & Schmeichel, 2012) provide a theoretical account of how working memory capacity may be influenced by ER. Self-control refers to the capacity assigned to alter responses for the purpose of long-term goals and adjustment to standards (Baumeister et al., 2007). It is required for controlling emotions as well as cognitive processing and is relevant to a wide range of desirable outcomes including well-being and academic success (cf., Baumeister et al., 2007; Hagger, Wood, Stiff, & Chatzisarantis, 2010). Research on ego depletion (reductions in self-control following previous exertion) suggests that the capacity to exert

self-control is limited (for a review, see Hagger et al., 2010), and ER may impair cognitive processing by drawing on the same pool of resources (e.g., Schmeichel, Vohs, & Baumeister, 2003). According to the process model of ego depletion (Inzlicht & Schmeichel, 2012), (a) motivational shifts (including effects of beliefs of (un)limitedness self-control; Job, Dweck, & Walton, 2010), and (b) shifts in attention can account for and moderate ego depletion effects. Based on evidence for connections between executive functions and self-regulatory mechanisms, Hofmann, Schmeichel, and Baddeley (2012) suggest that working memory capacity represents the limited 'workspace' required for cognitive and self-regulatory demands. In addition to its contribution to cognitive performance, it is thought to maintain self-regulatory goals, filter distractors, direct attention, suppress thought intrusions, and regulate emotions (Hofmann et al., 2012).

The assumed relation between working memory capacity and ER is supported by studies showing that attempts to regulate emotions can result in decreased working memory capacity (Johns et al., 2008; Schmeichel, 2007). In contrast, Johns et al. (2008) found that reappraisal preserved whereas expressive suppression impaired cognitive performance suggesting that the susceptibility of cognitive resources to ER may depend on the particular strategy. It remains unclear whether N- reappraisal is capable of preserving cognitive resources when it is used to reduce intense negative emotional reactions to academic failure. Moreover, it is unknown whether N- and P+ tactics draw on self-control capacity to an equal extent, and how this affects working memory capacity. Tice et al. (2007) found that the induction of positive emotions can counteract the depletion of self-control resources. Induced positive affect restored performance on various tasks, such as persistence on unsolvable puzzles or change in handgrip physical stamina (Tice et al., 2007) and enhanced working memory capacity, as measured by operation span tasks (Storbeck & Maswood, 2016; Yang et al., 2013). Based on these findings we assume that self-generated positive emotions resulting from reappraisal may also be able to reduce ego depletion and preserve self-control capacity. In turn, the resulting level of self-control capacity should be associated with working memory capacity (e.g., operation span; Turner & Engle, 1989).

6.1.4. Objectives and Hypotheses

The present study examines whether P+ and N- reappraisal tactics of regulating emotional reactions to failure feedback differ in terms of their emotional, resource-related, and cognitive outcomes. A first objective of the present study was to investigate whether a P+

reappraisal tactic is associated with higher positive affect and smaller decreases in perceived self-control capacity (less ego depletion) than an N- tactic. Second, we aim to examine whether positive emotions are generally predictive of the level of perceived self-control capacity. Third, we strive to understand how the level of perceived self-control capacity (affected by preceding ER efforts) is connected with working memory capacity.

6.2. Material and methods

6.2.1. Design

In a mixed 4 (treatments) x 3 (time) design, we compared two experimental groups – P+ vs. N- reappraisal tactic – and two control groups in which the emotion was either not regulated (no regulation, NR) or no emotion was induced (no treatment, NT).

6.2.2. Participants

N = 141 participants were recruited from the university population and the urban community of a German university town. In order to motivate participants 100-€-gift-coupons were announced as a reward for the best five participants of the sample.

Participants were randomly assigned to one of the four groups. Since we expected a small difference between the two reappraisal groups, the experimental groups (33% each) were kept twice as large as the control groups (17% each) which mainly served as reference values. We excluded 10 participants from the analyses because they doubted the authenticity of failure feedback and 13 because of incomplete data. This left *N* = 118 participants (n_{P+} = 38; n_{N-} = 41; n_{NR} = 18; n_{NT} = 21), 34% female (M_{age} = 25.1 years, *SD* = 6.4, range 18-55), 87% students, 11% working.

At the end of the experiment, participants were carefully debriefed regarding the purpose of the study and the failure feedback deception. It was ensured that they had completely recovered from the induced negative emotions. Participants were offered to receive their true test results after completion of the study.

6.2.3. Procedure

Participants were tested individually in 90-minutes-sessions (see Figure 1; for instructions see Appendix A). The probands were told that the results from a combination of different

cognitive ability tasks would be aggregated at the end of the session.

First, participants in all groups completed a short cognitive ability test. To ensure the credibility of the faked test-result, the experimenter then pretended to evaluate the test results (experimenter announced evaluation, disappeared behind screen, and repeatedly clicked mouse). Next, participants in the two experimental groups were instructed how to evaluate their test result in case of a poor score, (i.e., to use P+ or N- reappraisal). Participants in both control groups read a neutral text on test evaluation instead. A first short questionnaire was completed next (pre-ER assessment) including demographic data and ratings of affect and perceived self-control capacity.

We induced negative emotions by presenting a false poor test result (failure feedback; e.g., Nummenmaa & Niemi, 2004) to the P+, N-, and NR group: A figure illustrated a false poor test score within a normal distribution of test scores in order to point out the position of the test person in comparison to its peer group, including the percentile (17.97%). The figure was accompanied by a written explanation. Participants in the NT group instead read a short message announcing that they would receive their test results at the end of the session.

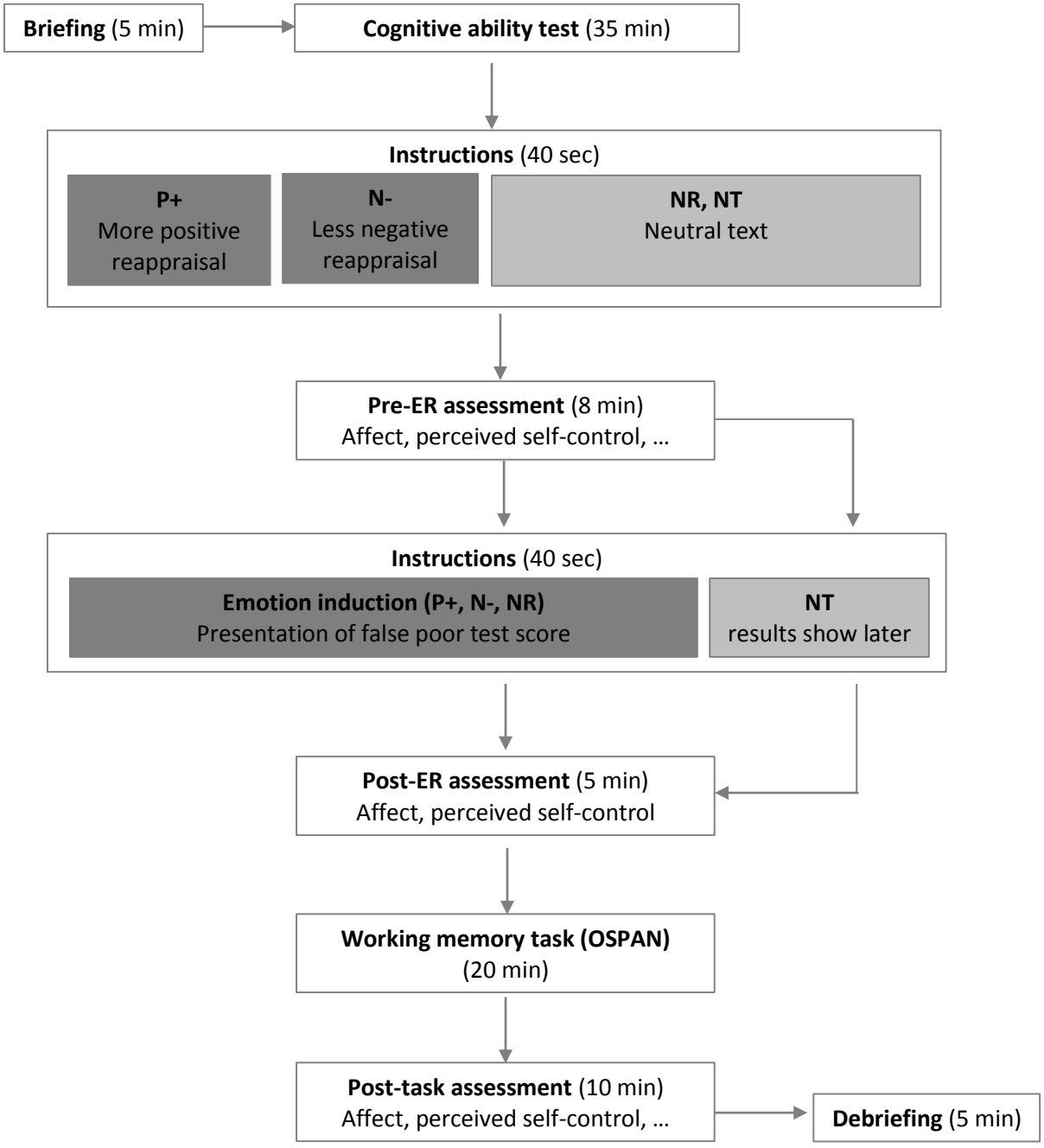

Figure 1. Sequence and duration of tasks, instructions, and self-report assessments in the two experimental and the two control groups. ER = emotion regulation; P+ = more positive reappraisal group; N- = less negative reappraisal group; NR = no regulation group; NT = no treatment group; OSPAN = operation span task. All tasks, instructions, and self-report measures were presented on a computer.

Afterwards, all participants rated their affect and perceived self-control capacity for the second time (post-ER assessment) and, subsequently, completed a working memory task (operation span task). Finally, they rated their affect and perceived self-control capacity for the third time (post-task assessment). In addition, participants answered manipulation check questions (P+, N-, NR) and reported individual reappraisal techniques (P+, N-).

6.2.4. Tasks

Cognitive ability. We used selected items from the I-S-T 2000 R basic component version A (Liepmann, Beauducel, Brocke, & Amthauer, 2007) as the cognitive ability task. Cognitive ability scores of the groups (Appendix B, supplementary material) were not part of the present analyses.

Working memory capacity. Working memory capacity was measured by means of a web-based version ("Web-OSPAN," 2012) of the operation span task (OSPAN; Turner & Engle, 1989), a reliable and valid measure of working memory span (e.g., Conway, Kane, & Al, 2005; Kane, Conway, Miura, & Colflesh, 2007). The task required participants to evaluate the correctness of math equations (e.g., (4 x 3) - 2 = 10) and to memorize target words (e.g., poodle) at the same time. Words, equations, and set size (2 - 7 word-equation pairs) varied randomly (total of 18 sets consisting of 81 pairs). At the end of a set, participants were asked to recall the target words in correct order from a list of possible words (50% distractor words). For our experiment, affectively neutral German target and distractor words were chosen from the Berlin Affective Word List (BAWL; Võ, Jacobs, & Conrad, 2006). The task was completed on a computer (duration M = 14:29 min, SD = 2:58). Our analyses focus on total and partial memory span scores (see Table 1).

6.2.5. Self-report measures

State affect. State affect was measured using the Self-Assessment Manikin (SAM; Bradley & Lang, 1994), an affective rating system with good psychometric properties (e.g., Backs, da Silva, & Han, 2005) that assesses three affective dimensions: valence, arousal, and dominance. Each dimension was measured by a 5-point scale picture-based item (5 represents high ratings), composed of five pictures depicting human-like figures (e.g., to assess valence, the figure varies from smiling to frowning). Since previous studies were able to detect affective differences using the 5-point version (e.g., Quesada, Wiemers, Schoofs, & Wolf, 2012), we assumed the scale being appropriate for the examination of

momentary affective changes.

State perceived self-control. Perceived self-control capacity was assessed by the State Self-control Capacity Scale-Deutsch (SSCCS-K-D; Bertrams, Unger, & Dickhäuser, 2011), a German short version of the State Self-Control-Scale (Ciarocco et al., 2007). It includes 10 items (e.g., I feel drained) which are answered on a 7-point scale ranging from *strongly disagree* (1) to *strongly agree* (7). We included one additional item from the full scale ("My mental energy is running low") because of its excellent item-total correlation (.79) and because its contents is quintessential for the self-control concept. In the present sample, we excluded one item ("I need something pleasant to make me feel better") due to consistently low item-total-correlations. Final reliability coefficients were satisfying across assessments (Cronbach's Alpha = .78/ .84/ .82).

Individual reappraisal techniques. Participants reported the individual thoughts they had used to reappraise their alleged test failure in an open-ended answer format. Answers were categorized by two raters blind to reappraisal condition (see Table 3; coding procedure by McRae et al., 2012). Agreement between raters was substantial (Cohen's Kappa = .76).

6.3. Results

6.3.1. Manipulation Checks

Participants in the emotion induction groups rated their satisfaction with the test result on a 5-point scale (low satisfaction indicated effective emotion induction). The reappraisal groups additionally rated their compliance with the ER instructions, as well as perceived success and difficulty of ER. At the very end of the experiment, the emotion induction groups rated the credibility of the test result.

Effectiveness of negative emotion induction. To examine changes in affect from pre-ER to post-ER (groups P+, N-, NR), we conducted a 3 (groups) x 2 (time) mixed-factors analysis of variance (ANOVA) each for valence, arousal, and dominance. Valence ($F(1,92) = 20.44$, $p < .001$, $\eta_p^2 = 0.18$) became more negative and dominance ($F(1,92) = 12.54$, $p = .001$, $\eta_p^2 = 0.12$) decreased significantly during the emotion induction sequence; the increase in arousal was not significant ($F(1,92) = .79$, $p = .375$). Interactions of group and time were not significant for all affect measures ($ps > .201$) indicating that a negative emotion was successfully induced. Valence, arousal and dominance values are shown in Table 1.

Additionally, we compared the credibility of the test result and participants' satisfaction with it for the emotion induction groups with a multivariate ANOVA. No multivariate effect of group was found ($F(4,188) = 0.62$, $p = .651$) suggesting that emotion induction was equally effective and credible.

Effectiveness of reappraisal instructions. We performed a multivariate ANOVA (groups P+, N-) that included the ratings of instruction compliance, reappraisal difficulty and success. A multivariate main effect of group ($F(3,75) = 5.14$, $p = .003$, $\eta_p^2 = 0.17$) indicated group differences in instruction effectiveness. The P+ group reported lower instruction compliance ($M_{P+} = 2.92$, $SD_{P+} = 1.02$; $M_{N-} = 3.73$, $SD_{N-} = 1.20$; $F(1,77) = 10.31$, $p = .002$) and higher perceived difficulty of reappraisal ($M_{P+} = 3.39$, $SD_{P+} = 1.17$; $M_{N-} = 2.56$, $SD_{N-} = 1.16$; $F(1,77) = 10.04$, $p = .002$) than N- probands. However, since perceived reappraisal success did not differ between the groups ($M_{P+} = 3.39$, $SD_{P+} = 0.95$; $M_{N-} = 3.51$. $SD_{N-} = 1.05$; $F(1,77) = 0.27$, $p = .604$), we considered the instructions equally effective.

Table 1

Mean (SD) Self-reported Affect and Perceived Self-control Capacity (PSC) by Group across Assessments and Working Memory Capacity Scores (OSPAN) by Group

	Group			
Measure	More positive (*n*=37)	Less negative (*n*=40)	No regulation (*n*=18)	No treatment (*n*=21)
Valence				
Pre-ER	3.65 (0.68)	3.88 (0.69)	3.89 (0.58)	3.90 (0.62)
Post-ER	3.35 (0.75)	3.55 (0.78)	3.50 (0.51)	3.86 (0.65)
Post-task	3.78 (0.79)	3.73 (0.82)	3.72 (0.67)	3.62 (0.92)
Arousal				
Pre-ER	2.27 (1.07)	2.28 (1.09)	2.22 (1.00)	2.33 (0.91)
Post-ER	2.49 (1.07)	2.18 (0.93)	2.33 (0.97)	2.05 (0.92)
Post-task	2.41 (1.01)	2.25 (0.98)	2.28 (1.07)	2.52 (1.08)
Dominance				
Pre-ER	3.30 (0.62)	3.58 (0.75)	3.39 (0.70)	3.14 (0.91)
Post-ER	3.05 (0.66)	3.25 (0.78)	3.33 (0.69)	3.43 (0.60)
Post-task	3.43 (0.87)	3.43 (0.93)	3.39 (0.92)	3.24 (0.70)
PSC				
Pre-ER	3.98 (0.77)	4.30 (0.75)	4.18 (0.83)	4.05 (0.85)
Post-ER	3.78 (0.91)	4.03 (0.78)	3.88 (0.87)	4.04 (0.96)
Post-task	3.75 (0.93)	4.13 (0.77)	4.11 (0.85)	4.03 (0.81)
OSPAN				
Total	42.00 (15.40)	47.56 (15.48)	44.00 (16.57)	47.52 (12.05)
Partial	63.84 (8.49)	65.76 (10.09)	64.89 (11.05)	66.81 (8.38)

Note. Valence, dominance, arousal, and perceived self-control capacity were measured on 5-point scales; OSPAN Total refers to the number of correctly recalled items in the correct position (out of 81); OSPAN Partial refers to the number of correctly recalled items regardless of position (out of 81).

6.3.2. ER Effects on Affect and Perceived Self-control Capacity

Changes in affect and perceived self-control. To analyze changes in affect and perceived self-control we performed a 4 (groups) x 3 (time) mixed-factors MANOVA that accounted for affect (valence, arousal, dominance) and perceived self-control capacity. It yielded a multivariate main effect of time ($F(8,105) = 3.23$, $p = .003$, $\eta_p^2 = 0.20$), but no main effect of group ($F(12,333) = 0.47$, $p = .934$) and a significant multivariate interaction effect of time and group ($F(24,321) = 1.72$, $p = .020$, $\eta_p^2 = 0.11$). Descriptive values for affective variables and perceived self-control are specified in Table 1. Significant multivariate effects were examined in more detail using univariate analyses.

The main effect of time was due to significant univariate changes in valence ($F(2,224) = 7.18$, $p = .001$, $\eta_p^2 = 0.06$) and perceived self-control capacity ($F(2,224) = 4.45$, $p = .013$, $\eta_p^2 = 0.04$). Changes in dominance ($F(2,224) = 1.30$, $p = .276$) and arousal ($F(2,224) = 0.97$, $p = .381$) were not significant. Repeated-measures contrasts revealed that valence changed significantly in the negative direction from pre- to post-ER ($F(1,112) = 16.95$, $p < .001$; $\eta_p^2 = 0.13$) and increased again from post-ER to post-task ($F(1,12) = 4.23$, $p = .042$, $\eta_p^2 = 0.04$). Perceived self-control capacity also declined significantly from pre- to post-ER ($F(1,112) = 8.98$, $p = .003$, $\eta_p^2 = 0.07$). However, the increase from post-ER to post-task did not reach significance ($F(1,112) = 1.37$, $p = .244$).

Univariate interactions were significant for valence ($F(6,224) = 2.29$, $p = .036$, $\eta_p^2 = 0.06$) and dominance ($F(6,224) = 2.72$, $p = .014$, $\eta_p^2 = 0.07$), but not for arousal ($F(6,224) = 1.57$ $p = .157$) and perceived self-control ($F(6,224) = .68$, $p = .664$). Planned repeated contrasts illustrate that the interaction on valence was significant from post-ER to post-task ($F(3,112) = 3.78$, $p = .013$, $\eta_p^2 = 0.09$). The interaction on dominance was significant from pre-ER to post-ER ($F(3,112) = 6.48$, $p < .001$, $\eta_p^2 = 0.15$) and marginally significant from post-ER to post-task ($F(3,112) = 2.55$, $p = .060$, $\eta_p^2 = 0.06$). To closer examine these interactions, univariate ANOVAs with post-hoc tests were conducted, comparing the change scores of valence and dominance between the four groups. Also, paired t-tests were run separately for each group comparing valence and dominance values between (a) pre-ER and post-ER and (b) post-ER and post-task. Significant changes as well as group differences in the size of changes are indicated in Table 2.

Taken together, although the extent of affective changes was similar in the three emotion induction groups, only the P+ group managed to remedy positive affect and

dominance during the working memory capacity task, suggesting a distinct profile for this group.

Table 2

Changes in Valence and Dominance by Group

	Group			
Change	More positive	Less negative	No regulation	No treatment
Valence				
Pre-ER – post ER	-2.74*	-2.69*	-3.29**	0.44
Post-ER – post-task	3.61**[a]	1.36	-1.72	1.56
Dominance				
Pre-ER – post ER	-2.99**[a]	-3.59*[a]	-0.44	2.33*
Post-ER – post-task	2.67*[b]	1.64	-0.29	1.16

Note. Values represent t-values (paired test). ** $p < 0.01$; * $p < 0.05$; [#] $p < 0.10$; [a] indicates a significant difference of a change score compared to change in the no treatment group ([b] indicates a marginal significant difference).

Effects of individual reappraisal techniques on affect and perceived self-control. Table 3 shows how many participants used each reappraisal technique. None was used more frequently by one of the two reappraisal groups (χ^2 values ≤ 3.23; ps $\geq .084$); the number of simultaneously used techniques did also not differ ($F(1,70) = 0.32$, $p = .575$). To explore whether perceived reappraisal success and difficulty as well as post-ER affect and perceived self-control were influenced by the number of used techniques, linear regression analyses were conducted collapsing across groups. The number of used reappraisal techniques did not predict post-ER affect and perceived self-control capacity (ps $\geq .393$), but a higher number of techniques was associated with higher perceived reappraisal success ($\beta = .22$, $p = .049$; $R^2 = .05$) and lower difficulty ($\beta = -.23$, $p = .045$; $R^2 = .05$).

Table 3

Number of Participants Who Used Each Reappraisal Technique

Technique	More positive	Less negative
Technical	17	20
Change current circumstances	15	16
Reality Challenge	7	8
Change future circumstances	8	5
Acceptance	4	7
Agency	5	4
Explicitly Positive	5	1
Distancing	3	3

6.3.3. Relationship of Affect and Perceived Self-control

To examine whether valence was generally predictive of perceived self-control capacity and if arousal and dominance also contributed to perceived self-control capacity, multiple regression analyses for each measurement point were performed with perceived self-control capacity as the criterion and the affect variables as predictors. These analyses collapsed across groups. Results showed that pre-ER affect significantly predicted pre-ER perceived self-control capacity (R^2 = .26, F(3,112) = 12.94 , p < .001); valence (β = .38, p < .001) and dominance (β = .20, p = .021) were significant predictors. The post-ER multivariate regression model (R^2 = .22, F(3,112) = 10.39, p < .001) showed that valence was still a significant predictor (β = .40, p < .001) but dominance only approached significance (β = .15, p = .081). Post-task affect again predicted post-task perceived self-control capacity (R = .45, R^2 = .20, F(3,112) = 9.53, p < .001) but valence was the only significant predictor (β = .42, p < .001). Across assessments and groups, perceived self-control capacity was higher when affect was more positive. While higher dominance was associated with higher perceived self-control capacity before ER, it lost its predictive power afterwards.

6.3.4. Effects on Working Memory Capacity

Working memory capacity scores (total and partial) are shown in Table 1. A one-way ANOVA that compared the groups' scores showed no significant differences in total

($F(3,114) = 1.11$, $p = .348$, $\eta_p^2 = 0.03$) and partial memory span ($F(3,114) = 0.52$, $p = .672$, $\eta_p^2 = 0.01$).

In order to examine how self-control and affect variables contribute to working memory capacity and to identify the best predictor(s) backward elimination regression analyses were conducted separately for the P+ and the N- group predicting working memory capacity (total or partial scores, respectively). We entered perceived self-control capacity, valence, arousal, and dominance (all post-ER) as well as the interaction terms of self-control with each of the affect variables into the respective model. Those variables that made a unique contribution to the prediction were retained. The final models of the remaining variables capable of predicting working memory capacity are provided in Table 4. The results reveal different patterns for P+ and N- reappraisers. Working memory capacity in N- reappraisers was extended with higher perceived self-control capacity while affect had no influence. However, as for P+ reappraisers' working memory capacity affective influences were moderated by perceived self-control capacity. In depleted P+ users, cognitive performance profited from higher dominance and more negative valence. However, when perceived self-control was high, lower dominance and more positive valence facilitated cognitive performance.

Table 4

Backward Elimination Regression Analyses Predicting Working Memory Capacity (OSPAN)

	OSPAN Total			OSPAN Partial		
Predictors per group	*b*	*SE*	*t*	*b*	*SE*	*t*
More Positive						
Valence	-40.10	13.06	-3.07**	-23.67	6.84	-3.46**
Dominance	35.66	12.65	2.82**	20.27	6.63	3.06**
PSC x Valence	10.67	3.05	3.50**	6.20	1.60	3.89***
PSC x Dominance	-9.49	3.09	-3.07**	-5.42	1.62	-3.35**
Less Negative						
PSC	6.97	2.83	2.46*	5.99	1.80	3.32**
Dominance	5.05	2.84	1.77#			

Note. PSC = Perceived self-control capacity; *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; # $p < 0.10$.

6.4. Discussion

The present study investigated the affective, resource-related, and cognitive consequences of cognitive reappraisal used to regulate negative emotions in response to failure feedback. The study shows that P+ and N- reappraisal tactics act differently on affect. In contrast, their average consumption of perceived self-control resources and impact on working memory capacity were similar. In line with previous findings, the results suggest that positive emotions can enhance perceived self-control. Crucially, the relationship between perceived self-control capacity and cognitive performance was also shown to depend on the reappraisal tactic and its affective outcomes. Taken together, these results emphasize the importance of ER in the context of academic learning.

6.4.1. P+ Reappraisal Repaired Positive Affect

The exclusive regain of positive valence and dominance in the P+ group indicates a higher effectiveness of the P+ tactic for dealing with failure feedback, although the resulting level of positive affect did not clearly distinguish P+ from N- reappraisal. While previous studies found that P+ reappraisal maintains (Leroy et al., 2012; Shiota & Levenson, 2012) or even increases positive affect (Rood et al., 2012; Strain & D'Mello, 2015; Witvliet et al., 2010), our data suggest that P+ reappraisal may rather restore positive emotional states. Due to discrepancies in the timing of measurements restoring processes might be overlooked or mistaken as maintaining effects. Our results demonstrate that P+ reappraisal effectively restores positive affect when a clearly negative event like academic failure is experienced. Importantly, it is more effective than N- reappraisal which did not repair positive affect.

The present findings also extend our knowledge on the resource consumption of ER tactics. While Johns et al.'s (2008) results suggested preservation of resources through reappraisal, we did not find such a conserving effect for N- or P+. It could be speculated whether the emotional experience resulting from failure feedback is especially difficult to regulate (see Webb, Miles, & Sheeran, 2012). Repairing positive affect after failure feedback through P+ reappraisal may thus have required as much self-control as the less effective regulatory attempts via N- reappraisal.

6.4.2. Positive Affect Aided Perceived Self-control Capacity

Our assumption that the magnitude of positive valence would be predictive of perceived self-control capacity was confirmed. In line with ego depletion research (Tice et al., 2007), this result indicates a close link between positive affect and self-control resources. Like externally induced positive emotions, positive affect appears to be generally interconnected with high self-control, irrespective of whether it emerges spontaneously or through reappraisal.

6.4.3. P+ and N- Reappraisers Use Similar Techniques

Interestingly, users of P+ and N- reappraisal did not differ in terms of the nature or number of used techniques. In contrast, McRae et al.'s (2012) found that reappraisers (without tactic-restrictions) aiming to up-regulate positive affect used more "explicitly positive" and less "reality challenge" tactics than reappraisers trying to down-regulate negative affect. Also, in the present study, reappraisal was perceived more successful when a higher number of individual techniques was deployed, whereas Aldao & Nolen-Hoeksema (2013) found that using multiple strategies was less effective than single strategy use. Since in our experiment, multiple techniques were only perceived as being more successful, but, in fact, did not have a different impact on affect or perceived self-control, actual success apparently diverges from perceived success. The use of a higher number of techniques may be due to a larger repertoire. Repertoire size may promote subjective beliefs about one's ER capability and thus cause participants to rate their regulatory success higher. Alternatively, participants who evaluated regulatory success higher may have recalled more techniques in retrospect to underpin their evaluation of success.

In this study, the use of P+ and N- reappraisal had different affective implications although both reappraisal groups made similar use of individual techniques to implement the instructed reappraisal tactics. Hence, it seems to be more crucial for the effectiveness of ER whether participants adopt a P+ or an N- tactic than the (number of) chosen techniques or perceived ER success. Interventions that aim at fostering positive emotions may thus focus more on teaching broader P+ tactics rather than practicing specific techniques.

6.4.4. Perceived Self-control Resources Act Differently on Working Memory Performance in P+ and N- Reappraisers

Our results indicate that working memory capacity increased with the perceived level of

self-control only in N- reappraisers. The findings suggest that the mechanism may be more complex when engaging in P+ reappraisal because working memory capacity then also depends on the affective state: The results might indicate that in depleted P+ reappraisers, working memory performance profits from high dominance and negative valence. In contrast, non-depleted P+ reappraisers' working memory capacity seems to benefit from low dominance and positive valence. A combination of high dominance and negative valence resulting from P+ reappraisal might thus have the opposite effect as with N- reappraisal and enable P+ reappraisers to perform well even under conditions of ego depletion.

The present results complement and elaborate on previous evidence on the overlap of self-control and working memory capacity (Hofmann et al., 2012), consistent with the view of working memory capacity as a provider of capacity for both cognitive and self-regulatory demands. Tactics of reappraisal may influence cognitive performance and hence academic achievement by means of their varying affective consequences and consumption of self-control resources. In contrast to findings of enhanced working memory capacity with induced positive affect (Storbeck & Maswood, 2016; Yang et al., 2013), we observed that self-generated positive affect resulting from ER enhanced working memory capacity only when P+ reappraisal tactics were employed and self-control was not depleted. This association of positive affect with extended working memory capacity was reversed in depleted P+ reappraisers, suggesting that negative valence may be more beneficial for their cognitive performance. Affect had no impact on performance if N- reappraisal tactics were employed, indicating that effectiveness of ER is not crucial for cognitive performance when N- reappraisal is used.

6.4.5. Limitations and Suggestions for Future Research

The present research has two major limitations that need to be considered in future research.

First, we observed higher perceived instruction difficulty and lower compliance for P+ reappraisal, as compared to N- reappraisal. The qualitative shift from negative to positive valence in P+ reappraisal (McRae et al., 2012) might have been hard to accomplish in case of failure feedback. Since a higher number of regulation attempts is known to enhance the effects of ER (Webb et al., 2012), reappraisal practice (cf., Kim & Hodges, 2011; Schartau et al., 2009) may be required to reduce ER difficulty and to boost instruction compliance even in failure situations.

Second, demand effects on self-reported emotions are highly unlikely but cannot be rule out entirely. Our design did not allow participants to contrast different ER tactics against each other. Using additional indirect measures of emotional experience like implicit tests (e.g., Quirin, Kazén, & Kuhl, 2009) may further reduce the risk of demand effects. It may also be speculated whether the use of a 5-point bipolar measure of affect may have lacked resolution for the examination of affective changes (compared to the original, more widely used 9-point version; Bradley & Lang, 1994). To reduce the risk of measurement artifacts, additional behavioral indicators of self-control capacity (e.g., task persistence, Stroop performance) may be used to complement self-report.

It would further be interesting to investigate what factors determine individual variability in self-control consumption and ER effectiveness among P+ reappraisers in order to better predict working memory capacity. It may be promising to reduce tactic difficulty through ER practice (cf., Schartau et al., 2009) or to consider beliefs about self-control being an (un)limited resource (Job et al., 2010). Moreover, future studies on the effectiveness of P+ and N- reappraisal may address a broader range of negative academic emotions (e.g., anxiety or anger; Pekrun et al., 2002) and (real world) academic and non-academic learning situations (e.g., learning at school, homework, learning on the job, or even learning to drive or commencing new sports) in order to better evaluate the role of reappraisal in education.

6.4.6. Conclusion

The ways in which learners regulate their emotions are relevant to test preparation and test taking as well as a broad range of learning situations that are cognitively demanding and require self-control. The present findings corroborate the beneficial role of P+ reappraisal for positive affect and offer initial evidence on the role of P+ and N- reappraisal in cognitive performance. P+ reappraisal appears to be a difficult yet effective ER tactic capable of restoring positive affect even in situations of academic failure. Both P+ and N- reappraisal may either facilitate or harm academic success, depending on their demand of self-control resources and their affective impact, but independent of individual variations in tactic implementation and perceived regulatory success.

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6.6. Appendix A

Instructions [translated from German]

ER instructions for experimental conditions: *more positive (less negative)* reappraisal tactic (based on McRae et al., 2012):

> Important information on the importance of the test result for the overall score: In case you have done poorly on the test, try to adopt a *positive (less negative)* perspective. Experience shows that irrespective of the test result, just taking the first test improves your concentration; therefore you have a *large (certain)* performance benefit on the following tasks. If you make an effort in the next tests, you can still achieve an *excellent (average)* result on aggregate.

ER instruction for control conditions:

> Information on the assessment of the cognitive ability test: Of the nine task clusters three clusters at a time will be combined to form scales. The three scales generated in this manner assess verbal, numeric, and figural ability facets. In addition, the total score (sum of raw values) of the nine task clusters is calculated in order to assess deductive thinking. According to the assignment to the specific norm groups, raw values are transformed to standard values for each task cluster and scale.

Instruction for negative emotion induction:

> Your test score is 21.5 points (out of 45). This equates to the 17.97%-percentile of your age cohort. That means: 82.03% of your peers with comparable educational level achieve a higher test score.

6.7. Appendix B (supplementary material)

Mean (SD) cognitive ability scores by group

	Group			
Measure	Increase positive (*n*=37)	Decrease negative (*n*=40)	No regulation (*n*=18)	No treatment (*n*=21)
Verbal ability	10.62 (2.24)	9.88 (2.43)	9.67 (2.14)	10.19 (2.36)
Numeric ability	10.95 (3.31)	10.58 (3.33)	9.33 (3.05)	10.38 (3.43)
Figural ability	8.54 (2.22)	9.25 (2.23)	8.89 (2.27)	8.14 (2.80)
Total score	30.11 (5.92)	29.70 (6.03)	27.89 (5.79)	28.71 (5.82)

Note. In order to cover the range of item difficulties every 5th item of the original 180-item-test (Liepmann et al., 2007) was used. The resulting pool consisted of 15 items each for verbal, numeric, and figural ability. Ability values = number of correct answers (out of 15); total score = number of correct answers (out of 45).

7. Manuscript C

Integrating Emotion Regulation in Programs of Self-regulated Learning – Training Effectiveness and Consequences for Self-control Capacity in Secondary School Students

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Abstract

Regulation of academic emotions is considered to be important for successful self-regulated learning, especially when positive emotions are up-regulated to minimize self-control depletion. The present study compares an integrated training program that fosters both self-regulated learning and emotion regulation to an emotion regulation-only and a control program. Eight groups of secondary school students (N = 106) took part in one of the programs, each involving three 90-minute sessions in weekly intervals. Before and after the intervention, use of emotion regulation and self-regulated learning strategies as well as participants' self-control capacity were assessed. Participants of the integrated program reported an increased use of self-regulated learning and emotion regulation strategies and their self-control capacity tended to augment. The emotion regulation-only program was less effective in fostering strategy use and self-control capacity. The results demonstrate clear benefits of an integrated approach to fostering academic emotion regulation in programs of self-regulated learning.

Keywords: emotion regulation; self-regulated learning; self-control; training

7.1. Introduction

Students experience a broad range of emotions in situations related to academic learning and achievement (Pekrun et al., 2002a). These 'academic emotions' involve positive (e.g., enjoyment of learning) as well as negative emotions (e.g., shame for failure) and include task- or self-related (e.g., joy about success, anxiety) as well as social emotions (e.g., admiration, envy). Academic emotions are known to influence academic success via motivation, cognition, and action: Positive emotions have been observed to promote motivational variables, cognitive resources, use of learning strategies, and academic achievement, whereas negative emotions caused detriments in these outcomes. Academic success may be of particular importance to secondary school students. Since results of examinations are highly relevant for educational progress and vocational opportunities, comparatively intense emotions can arise. Therefore, effective regulation of negative emotions is thought to be crucial to academic success and should be of particular relevance for the target group of secondary school students. Research on academic emotion regulation is emerging, but to date, there have been few attempts to foster the use of effective emotion regulation strategies in students, making the development of targeted interventions an important direction (cf., Jacobs & Gross, 2014). The present research aims to address this gap and to integrate emotion regulation into programs that foster academic learning.

7.1.1. Emotion Regulation and its Role in (Self-regulated) Learning

Emotion regulation refers to how people control which emotions they have, when these emotions occur, and the way they are experienced and shown in behavior (Gross, 1998b, 2015). Regulation strategies are classified into five sets according to the affected stage in the emotion-generative process: 'Situation selection' refers to approaching or avoiding a situation. For example, in the academic context, a student may decide to do math homework together with a friend as this will be more pleasant. 'Situation modification' means to change aspects of a situation. In order to increase their enjoyment of learning, the two students may start with a subject they like before turning to math homework or ask a parent for help. When 'attentional deployment' is used, attention is directed towards or away from specific aspects of a situation. Our students may deliberately focus on positive aspects of doing math homework, e.g., success on a very difficult task, and may thus experience more pride. 'Cognitive change' refers to modifying the evaluation of a situation. The two students may try

to reframe doing math homework as challenging instead of threatening in order to feel excitement instead of anxiety. When using 'response modulation', they may finally try to actively change the intensity of emotion they experience (e.g., increase their hope for success), the way they behaviorally express their emotions (e.g., not show an anxious face), or their physiological responses (e.g., reduce bodily tension by controlled breathing).

Given the wide influence of emotions on learning and achievement, they play an important role in concepts of self-regulated learning. Self-regulated learning refers to the process of adaptive goal pursuit in which learners set individual goals to accomplish, monitor their progress towards them, and regulate their cognition, motivation, and behavior in the service of goal pursuit (Pintrich, 2000). Self-regulated learning is considered a fundamental ability to acquire new knowledge and to adapt existing knowledge to new requirements and changing environments. It is therefore important for academic (lifelong) learning, vocational development, and professional careers (Schmitz, Schmidt, Landmann, & Spiel, 2007). The process-model of self-regulated learning by Schmitz and Wiese (2006) which is based on Zimmerman's (2000) three-phase cyclical model of self-regulation additionally stresses the importance of emotions in the learning process. The learning process is conceptualized as a sequence of consecutive learning states, each of which is thought to involve learners' thoughts, affective states, and activities that they generate to attain a learning-related goal. Within such a learning state, three phases are distinguished (preaction, action, and postaction; cf., Heckhausen & Kuhl, 1985). Six components are included in the preaction phase (situation, task, affect, goals, motivation, self-efficacy), four components in the action phase (self-monitoring, (meta-) cognitive and resource-management strategies, volitional strategies, learning time), and five in the postaction phase (self-reflection, quality and quantity of learning outcome, satisfaction with outcome, affect). Evaluations made in the postaction phase of a learning state are thought to serve as a basis for adapting goals and strategies with regard to the subsequent learning state. In doing so, regulation occurs within the learning process. Although Schmitz and Wiese assign affective influences to the preaction and postaction phase in the first place (e.g., hope for success, pride of good grades), research on academic emotions considers emotions to affect learning at all stages, also in the action phase (e.g., boredom and enjoyment during learning) (cf., Pekrun et al., 2002). As preconditions of learning, emotions are assumed to be associated with motivation and to influence the use of learning strategies during learning and learning quantity. Closely linked to satisfaction with learning quantity and quality, they further act as an outcome of learning and are viewed as precondition for subsequent learning at the same time.

Considering these manifold influences of emotions on processes of self-regulated learning, acts of emotion regulation should be considered a highly important co-determining factor, being as important for learning as cognitive and behavioral regulation forms (cf., Ben-Eliyahu & Linnenbrink-Garcia, 2013). Since emotions are relevant to all phases of self-regulated learning, strategies of emotion regulation can also be effective in the preaction, action, and postaction phase (see Figure 1). The role of emotion regulation in self-regulated learning can thus be described as a sub process within the process of self-regulated learning. It seems plausible that students can employ all emotion regulation strategies posited by Gross' (1998) process model of emotion regulation (situation selection, situation modification, attentional deployment, cognitive change, response modulation) to regulate emotions that occur before, during, and after learning.

Programs that promote self-regulated learning have been successfully implemented (Dignath & Büttner, 2008), also for the target group of secondary school students (e.g., Perels, Gurtler, & Schmitz, 2005). In these programs, emotion regulation is usually treated in the context of motivational strategies, is not given explicit emphasis, and lacks adequate differentiation of strategies. To integrate a variety of emotion regulation strategies into programs that foster self-regulated learning would take account of the high relevance of emotion regulation as a factor in self-regulated learning.

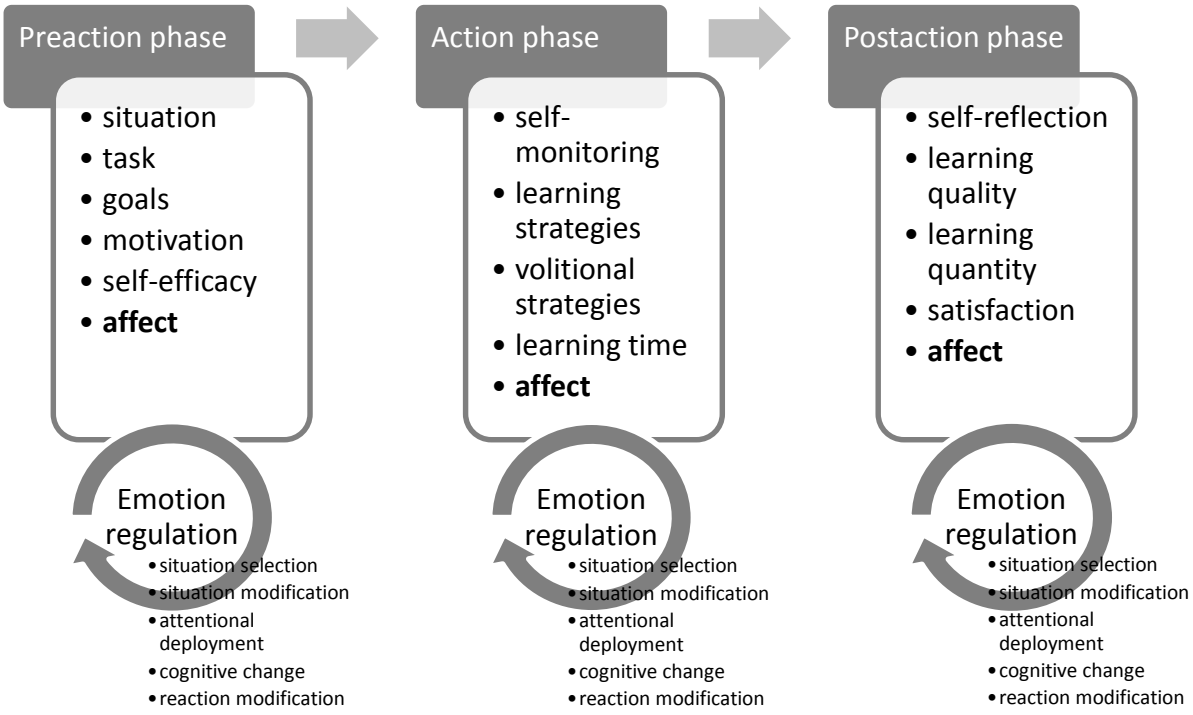

Figure 1. Emotion regulation as a sub-process of self-regulated learning (model extended from the process model of self-regulated learning by Schmitz & Wiese, 2006).

7.1.2. Promoting Positive Emotions in Negative Contexts to Conserve Self-control Capacity

Despite the importance and potential of emotion regulation for learning, research on emotion regulation in education is still scarce. Cognitive reappraisal, a particularly well-researched strategy of the cognitive change set, has been the focus of existing investigations of emotion regulation effects on academic learning. Reappraisal refers to modifying the emotional impact of a situation by changing one's interpretation of it (e.g., Gross, 2014). It was shown to have desirable effects on academic outcomes such as memory, task performance, and motivational variables (e.g., Davis & Levine, 2013; Gross, 2015; Kim & Hodges, 2011; Leroy, Grégoire, Magen, Gross, & Mikolajczak, 2012; Nett, Goetz, & Daniels, 2010; Strain & D'Mello, 2015).

On the question which emotion regulation strategies are more or less beneficial in educational contexts, relevant evidence is further provided by self-control research. Self-control refers to the capacity to change one's responses so as to adjust them to standards and to promote long-term goal pursuit (Baumeister et al., 2007). It is viewed as a conscious,

deliberate, and effortful subset of self-regulation, required across different domains such as controlling attention, emotions, or impulses as well as choice, cognitive and social processing. Self-control is thought to be relevant to many desirable outcomes including academic success and well-being (de Ridder et al., 2012). Deliberate emotion regulation as well as the components of self-regulated learning can be assumed to rely on that basic capacity. According to the strength model of self-control (Baumeister & Heatherton, 1996) an individual's capacity of self-control is limited. Thus, different kinds of self-regulatory acts are thought to draw on and compete for this basic resource of self-control (for a review, see Hagger, Wood, Stiff, & Chatzisarantis, 2010). The model assumes any self-regulatory effort to deplete self-control capacity and to cause a state of reduced capacity for concurrent or consecutive self-control efforts ('ego depletion'). However, there is evidence that the experience of positive emotions can replenish self-control capacity (Tice, Baumeister, Shmueli, & Muraven, 2007). Based on this finding, recent emotion regulation research has investigated whether emotion regulation strategies that up-regulate positive emotions in the face of negative events can minimize ego depletion effects and can hence benefit self-regulated learning. A couple of studies showed beneficial effects of a particular variation of reappraisal that focuses on the up-regulation of positive emotions instead of aiming at a down-regulation of negative emotions for regulation of academic boredom over a tedious task (Leroy et al., 2012; Strain & D'Mello, 2015) and regulation of negative affect caused by failure feedback (Scheibe & Schmitz, 2013). Reappraisal that involves up-regulation of positive emotions not only led to more positive affect, but there is first evidence that it draws less on self-control capacity than strategies that aimed at down-regulation of negative emotions or even conserves self-control, both to the benefit of learning and achievement (Scheibe & Schmitz, 2012, 2013).

These findings suggest that an intervention to foster self-regulated learning that integrates emotion regulation should particularly foster the use of positive emotion-regulatory goals in order to promote positive affect and minimize the consumption of self-control capacity. Moreover, according to Gross (2015), translating knowledge on emotion regulation processes into interventions should go beyond fostering single emotion regulation strategies such as reappraisal but include a broader range of strategies. Emotion regulation strategies other than cognitive reappraisal that refer to situation selection, situation modification, attentional deployment, and response modulation may likewise serve the up-regulation of positive emotions and should be given equal attention in interventions.

7.1.3. Research Objective and Hypotheses

The aim of the present study is to create and test an intervention that fosters both self-regulated learning and emotion regulation involving positive emotion-regulatory goals in secondary school students. This integrated training program of emotion regulation and self-regulated learning will be compared to an emotion regulation-only and a control program. The integrated program combines emotion regulatory with metacognitive/motivational strategies and thus represents an extension of the emotion regulation-only program, whereas the control program has a narrow focus on cognitive learning techniques and does not overlap with the two other programs. Effects on self-regulated learning, emotion regulation, and self-control capacity will be examined.

We expect the integrated training program to promote emotion regulation and self-regulated learning. The emotion regulation-only program is assumed to mainly promote emotion regulation. Both programs are assumed to foster self-control capacity. Therefore, effects of the emotion regulation-only program on self-regulated learning via self-control may also be expectable but we predict them to be less pronounced than the effects of the integrated program. The control program is expected to not cause any changes in the dependent variables.

7.2. Method

7.2.1. Design

We compared two experimental groups – integrated training of strategies of emotion regulation and self-regulated learning (IT) vs. emotion regulation training (ET) – and a control group that received training of cognitive learning techniques (CT) in a mixed 3 (groups) x 2 (time) quasi-experimental design.

7.2.2. Participants

One-hundred sixty secondary school students from 8th to 10th grade were recruited from 7 German secondary schools from the highest track (‘Gymnasium’). Students were compensated with gift coupons for participating in the three training sessions and pre- and post-training assessments (up to 20 €). All students participated voluntarily and a parent’s written consent for participation was obligatory. We randomly assigned each school-based

group to one of the three conditions. Since we were mainly interested in the difference between the two experimental groups, we kept the experimental conditions larger than the control group which mainly served as a reference group. We excluded 21 participants due to dropouts (IT: 11, ET: 8, CT: 2) and 33 due to incomplete data (IT: 10, ET: 17, CT: 6). There remained N = 106 participants, 58% female (M_{age} 14.6, SD=1.0, range 13-18), to be included in the analyses who had attended at least two of the three training sessions as well as pre- and post-assessments: n = 46 in the IT group (50 % female; M_{age} 14.4, SD=1.1, range 13-17), n = 45 in the ET group (67 % female; M_{age} 14.7, SD=.9, range 13-18), and n = 15 in the CT group (53 % female; M_{age} 14.5, SD=.8, range 13-16). Forty-four percent of the participants attended 8th grade, 39% attended 9th grade, and 17 % attended 10th grade of secondary school.

7.2.3. Procedure

Participants of all groups joined a pre-training meeting and six weeks later a post-training meeting and completed the pre- and post-assessments that included self-report trait measures of self-control capacity, emotion regulation strategy use in learning situations, and self-regulated learning strategy use, as well as a knowledge test on the contents of the three training sessions. The training program began two weeks after the pre-training assessment. It involved three 90-minute sessions that took place in weekly intervals after school within the schools' facilities. The post-training assessment was conducted two weeks after training completion.

There were four subgroups in the IT condition and three subgroups in the ET condition; the CT condition was not subdivided. These eight training groups had a mean size of 13 participants (range 8-19). Each group was trained by two qualified research assistants; a total of eight trainers contributed to the study.

7.2.4. Interventions

The study involved three types of training programs. The three programs were all equal in length and volume of work. While the ET program focused on emotion regulation in learning situations only (situation modification, attentional deployment, cognitive change, reaction modification), the IT program integrated both emotion regulation and self-regulated learning content (goal setting, planning, concentration, motivation in addition to emotion regulation contents). Intersections of emotion regulation and self-regulated learning contents are constituted by strategies that may serve either or both emotion regulation and self-regulated

learning, depending on the learner's needs: Situation selection, situation modification, and attentional deployment strategies overlap with planning and concentration strategies; motivational strategies also affect emotions. These intersection strategies were trained with a view to their multifaceted effectiveness. Self-regulated learning content in the IT program was based on existing programs by Keller, Ogrin, Ruppert, and Schmitz (2013) and Schmitz and Wiese (2006). It focused on metacognitive and motivational strategies and excluding purely cognitive techniques. Emotion regulation content in the IT and ET program was based on the strategies specified in scholarly and practitioner's literature on emotion regulation and emotion regulation interventions (Gross, 1998b, 2014, 2015, Macklem, 2008, 2011). We selected positive-oriented strategies or adapted strategies to this effect. The CT program, however, focused on cognitive learning techniques only (organization, elaboration, critical examination, repetition, knowledge use) and strictly excluded any emotional, motivational, volitional, or meta-cognitive content (program contents based on Keller, 2005; Mandl & Friedrich, 2006). In this article we focus on the description of the integrated training program which includes both emotion regulation strategies and self-regulatory strategies. The Appendix provides an overview of the contents of all three training programs.

The programs used a mixture of didactical methods including information parts, exercises, reflection elements, and discussions. At the beginning of the second and third training session, content of the last session was recapitulated. At the end of every session, the contents of the session were summarized and the students were given handouts. Moreover, they were invited to give oral feedback on the training content.

Integrated training program. The first training session started with an explanation of self-regulated learning, its components and phases. Next, the students learned about the importance of goals for successful learning and how to set useful goals ("SMART" criteria; divide a long-term goal into short-term goals), and subsequently practiced goal setting. The second part of the session focused on emotion regulation. Students reflected on and discussed which emotions typically occur in the three learning phases and learned about the effects of emotions on learning and achievement. Finally, they practiced finding connections between their thoughts (appraisals) and emotional reactions.

Session 2 dealt with the topics "planning" (including emotion regulation by situation selection and modification), "concentration" (including emotion regulation by attentional deployment), and "reaction modification". At first, the students learned and discussed how to plan their learning behavior (time management, e.g., plan time and order of tasks; learning strategy deployment, e.g., structure subject matter) and how to adapt the situation and the

learning environment in a way that supports learning and promotes positive emotions (e.g., choose calm place to learn, tidy up desk, seek help, find learning partner). Next, the participants reflected on typical external (e.g., noise, cell phone) and internal factors (e.g., thirst, argument with friend) that can distract from learning and which actions can be taken to promote concentration on the learning matter (e.g., switch off phone, plan to call the friend later). Students were told about attentional deployment as a way to regulate emotions and support concentration (e.g., focusing on interesting aspects, accomplishments, previous knowledge, work done, resources, strengths, or abilities) and discussed variations of this strategy and effects on their evaluations of a situation and resulting emotional reactions. Finally, the participants were instructed to practice a relaxation technique (progressive muscle relaxation) in order to learn how to regulate physical emotional reactions. In addition, they learned about a range of quick relaxation exercises that can easily be transferred into everyday life (e.g., alternate nostril breathing, scrunching and dropping shoulders).

The first part of the third training session dealt with "motivation" and "cognitive change" whereas the second part focused on transfer of all previously learned strategies in the training to a specific learning situation. The students collected motivation strategies (e.g., rewards, promoting interest, encouraging self-talk, focusing on success) and learned to differentiate between intrinsic and extrinsic motivation strategies. Furthermore, the participants learned that motivation strategies also affect emotions and vice versa and were encouraged to elaborate on motivation strategies by studying a worksheet at home and to test the suggested strategies (e.g., imagine goal attainment and acknowledgement, visualize progress towards goal). Next, emotion regulation strategies that involve cognitive change were introduced (e.g., distancing, positive self-talk, positive reframing/reappraisal). Then the students practiced positive reframing/reappraisal, by rephrasing negative to positive thoughts and were encouraged to further practice this technique after training. In the second part, the students developed ways to improve learning situations in small teams. By drawing on the knowledge gathered during the training program the participants first identified learning behavior, thoughts and feelings of a person described in a case example and then searched for the most suitable strategies to regulate learning behavior and emotions.

7.2.5. Measures

Knowledge test. The knowledge test on the training topics consisted of six multiple choice questions each for the three trainings. The present analyses exclusively account for knowledge on emotion regulation and self-regulated learning. Correct answers were added to a total

knowledge score (0-6) each for emotion regulation and self-regulated learning.

Self-report.

Emotion regulation. Use of emotion regulation strategies was assessed by the "Questionnaire of emotion regulation in the learning and achievement context" ("Fragebogen zur Emotionsregulation im Lern- und Leistungskontext"; Scheibe, 2009), a questionnaire designed to measure students' strategies to regulate negative (positive) emotions in response to negative (positive) feedback on academic performance. The instrument is designed for the learning and achievement context and specific to the target group of secondary school students, including strategies associated with desirable outcomes as well as strategies linked to undesirable outcomes such as positive/negative affect or high/low academic achievement. The questionnaire consists of ten multi-item scales, five each for the regulation of positive and negative academic emotions. We selectively used the five scales that assess strategies to regulate negative emotions (36 items total): Situation Analysis & Strategy Development (e.g., "I try to change the situation that causes the feelings"; $\alpha_{pre/post}$ = .75/.80), Positive Perspective (e.g., "I tell myself that I can rely on my abilities"; $\alpha_{pre/post}$ = .72/.70), Social Support (e.g., "I talk to someone about my feelings"; $\alpha_{pre/post}$ = .67/.72), Cognitive Avoidance & Distraction (e.g., "I do something I am good at to feel better"; $\alpha_{pre/post}$ = .72/.76), and Suppression & Withdrawal (e.g., "I try to hide my feelings"; $\alpha_{pre/post}$ = .79/.80). Items were to be rated on a 4-point scale ranging from (almost) never (1) to (almost) always (4).

Although strategies that have shown linkages with undesirable outcomes (Social Support, Cognitive Avoidance & Distraction, Suppression & Withdrawal) were not trained, we deliberately included them in the measures of this study, in order to assess differential effects of the training programs. We expected these 'nonequivalent dependent variables' (cf., Shadish, Cook, & Campbell, 2002) (not-trained emotion regulation strategies) to not be affected by training whereas we predicted an increase in trained strategies.

Self-regulated learning. Use of self-regulated learning strategies was assessed by an adapted version of the "Questionnaire of self-regulated learning Home/Class" (QSRL-Home/Class; Keller, Ogrin, Friedrich, Trautwein, & Schmitz, 2016). The QSRL-Home/Class is a modification of Otto's (2007) questionnaire for measuring SRL competencies which is based on the process-model of self-regulated learning by (Schmitz & Wiese, 2006). It measures self-regulated learning in class and during homework using nine scales (22 items total) that cover strategies to be deployed before (preactional), during (actional), and after a learning period (postactional). In the present sample, in order to improve psychometric properties, we aggregated the scales that measure planning of time and strategies, parting

tasks into subportions, and goal setting to a composite scale Planning & Goal Setting and combined the scales Effort and Concentration. The scale Monitoring and one item of the Motivation scale had to be excluded due to insufficient psychometric parameters. This resulted in two scales for the preactional phase (Planning & Goal Setting, e.g., „Parting difficult tasks in smaller portions“, $\alpha_{pre/post}$ = .72/.77; Motivation, e.g., “Dangle a reward for a difficult task (e.g., sweets)”, $\alpha_{pre/post}$ = .63/.61), as well as one scale each for the actional phase (Effort & Concentration, e.g., “Say to yourself ‘You will stay the course!’”,$\alpha_{t1/t2}$ = .65/.72) and the postactional phase (Reflection, e.g., “Compare actual results to the results of past learning”, $\alpha_{t1/t2}$ = .59/.68). Items were to be rated on a 4-point scale ranging from (almost) never (1) to (almost) always (4).

Self-control capacity. Self-control capacity was measured using the German version of the “Brief Self-Control Scale” (SCS-K-D; Bertrams & Dickhäuser, 2009). In order to keep questionnaire length reasonable, the three items with the smallest reported item-total-correlations (items 2, 4, 8) were not assessed. In the present sample, the deployed scale therefore consisted of 10 items (e.g., “Sometimes I can’t stop myself from doing something, even if I know it is wrong”, $\alpha_{t1/t2}$ = .73/.75). Items were to be rated on a 4-point scale ranging from disagree (1) to agree (4).

7.3. Results

7.3.1. Manipulation Check: Knowledge Gains

Paired t-tests that compared pre- and post-scores of knowledge on emotion regulation and self-regulated learning were run separately for the two experimental groups in order to reveal whether the training programs increased knowledge on the respective training topics. The ET group showed a knowledge gain for knowledge on emotion regulation ($t(32) = -3.26$, $p = .003$; $M_{pre} = 3.18$, $SD_{pre} = 1.01$; $M_{post} = 3.97$, $SD_{post} = 1.16$) whereas the increase in the IT group did not reach significance ($t(44) = -1.21$, $p = .234$; $M_{pre} = 2.78$, $SD_{pre} = 1.28$; $M_{post} = 3.04$, $SD_{post} = 1.27$). As for knowledge on self-regulated learning, expectedly, a significant increase was observed in the IT group ($t(44) = -7.03$, $p < .001$; $M_{pre} = 3.51$, $SD_{pre} = 1.10$; $M_{post} = 4.93$, $SD_{post} = 0.81$) but not in the ET group ($t(32) = -0.67$, $p = .511$; $M_{pre} = 3.73$, $SD_{pre} = 0.94$; $M_{post} = 3.91$, $SD_{post} = 1.01$).

7.3.2. Use of Emotion Regulation Strategies

To examine whether the training programs led to changes in the use of emotion regulation strategies, five 3 (groups) x 2 (time) mixed-factors ANOVAs were performed that each accounted for the one of the 5 emotion regulation strategies at pre- and post-assessment. As expected, the main effects of group (ps > .090) and time (ps > .250) were not significant for any of the emotion regulation strategies. We found an expected significant interaction effect of time and group for Situation Analysis & Strategy Development but not for Positive Perspective. As expected, the interaction effects for Social Support, Cognitive Avoidance & Distraction, and Suppression & Withdrawal (not-trained emotion regulation strategies) were also not significant. Table 1 shows descriptive statistics for pre- and post-assessments of emotion regulation, self-regulated learning, and self-control capacity in the three groups as well as the results of interactions of time and group. Additional paired t-tests for each group revealed that the use of Situation Analysis & Strategy Development increased significantly only in the IT group ($t(45) = -3.08$, $p = .004$) but the increase in the ET group ($t(44) = -0.95$, $p = .346$) and the decrease in the CT group were not significant ($t(14) = 1.44$, $p = .173$). Significant t-tests are also indicated in Table 1.

Table 1

Descriptive Statistics by Group for Pre- and Post-assessments of Emotion Regulation Strategies, Self-regulated Learning Strategies, and Self-control Capacity and Results for Interaction Effects of Time and Group

	Group								
	Integrated training program (n = 46)		Emotion regulation training program (n = 45)		Control training program (n = 15)				
	pre	post	pre	post	pre	post			
Measure	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	df	F	η_p^2
Emotion regulation									
STR	2.18 (0.48)	2.45 (0.59)**	2.28 (0.50)	2.30 (0.60)	2.40 (0.60)	2.23 (0.73)	2,102	4.96**	0.09
POS	2.70 (0.54)	2.75 (0.52)	2.74 (0.56)	2.82 (0.57)	2.79 (0.69)	2.87 (0.67)	2,102	0.05	0.00
SOC	1.97 (0.62)	2.13 (0.73)	2.15 (0.68)	2.15 (0.75)	2.28 (0.67)	2.21 (0.81)	2,102	0.99	0.02
AVO	2.66 (0.39)	2.70 (0.44)	2.69 (0.52)	2.67 (0.57)	2.57 (0.49)	2.61 (0.57)	2,102	0.27	0.01
SUP	2.53 (0.59)	2.44 (0.72)	2.42 (0.68)	2.43 (0.73)	2.08 (0.80)	2.08 (0.70)	2,102	0.29	0.01
Self-regulated learning									
PLN	2.46 (0.53)	2.80 (0.54)***	2.43 (0.49)	2.56 (0.55)$^{\#}$	2.53 (0.55)	2.42 (0.54)	2,103	4.61*	0.08
MOT	1.98 (0.87)	2.43 (0.88)**	2.31 (0.80)	2.63 (0.81)**	2.30 (0.98)	2.43 (0.94)	2,103	0.75	0.01

CON	2.80 (0.50)	2.99 (0.58) *	2.80 (0.45)	2.89 (0.53)	2.87 (0.67)	2.97 (0.62)	2,103	0.33	0.01
REF	2.11 (0.62)	2.63 (0.69)***	2.25 (0.60)	2.35 (0.65)	2.22 (0.80)	2.33 (0.84)	2,103	4.57*	0.08
Self-control capacity	2.33 (0.49)	2.41 (0.52)#	2.34 (0.44)	2.25 (0.46)	2.37 (0.56)	2.49 (0.54)	2,103	3.14*	0.06

Note. STR = Situation Analysis & Strategy Development; POS = Positive Perspective; SOC = Social Support; AVO = Cognitive Avoidance & Distraction; SUP = Suppression & Withdrawal; PLN = Planning & Goal Setting; MOT = Motivation; CON= Effort & Concentration; REF = Reflection; response format for all measures: 1-4; indications of significance levels for interaction effects and pre-post comparisons (paired t-tests): *** $p < .001$; ** $p < .01$; * $p < .05$; # $p < .10$.

7.3.3. Use of Self-regulated Learning Strategies

The effects of the training programs on self-regulated learning were tested accordingly with four 3 (groups) x 2 (time) mixed-factors ANOVAs that compared pre- and post-assessments of self-regulated learning strategies in the three groups. The results showed that main effects of time were present for all self-regulated learning strategies ($p = .003$-$.049$); effects of group did expectedly not reach significance ($ps > .220$). The expected interaction effects were significant for Planning & Goal Setting and Reflection (see Table 1).

Additional paired t-tests performed for each group showed that Planning & Goal Setting increased significantly in the IT group ($t(45) = -3.87$, $p < .001$), and the increase in the ET group approached significance ($t(44) = -1.87$, $p = .068$). Motivation increased both in the IT group ($t(45) = -3.10$, $p = .003$) and in the ET group ($t(44) = -3.09$, $p = .003$). Effort & Concentration ($t(45) = -2.30$, $p = .026$) and Reflection ($t(45) = -5.18$, $p < .001$) increased exclusively in the IT group. The remaining changes in the ET group ($ps > .292$) and all changes in the CT group ($ps > .344$) were insignificant.

7.3.4. Self-control Capacity

To analyze training effects on self-control capacity, a mixed-factors ANOVA was conducted that compared pre- and post-values across the three groups. As expected, the main effects of group ($F(2,103) = 0.63$, $p = .536$) and time ($F(1,103) = 0.94$, $p = .333$) were insignificant and the interaction of time and group was significant (see Table 1). Additional paired t-tests that were run for the groups approached significance for the increase in the IT group ($t(45) = -1.88$, $p = .067$) and did not reach significance in the two other groups ($ps < .177$).

7.4. Discussion

The present study tested the effectiveness of an integrated training program that fosters both self-regulated learning and emotion regulation, compared to an emotion regulation-only and a control program. The study shows a clear superiority of the integrated program with respect to self-regulated learning, emotion regulation, and self-control capacity over the emotion regulation-only program.

7.4.1. Integrated Training Program Fostered Emotion Regulation More Effectively

Participants in both experimental groups profited from the interventions and acquired new knowledge. As expected, the ET training program led to a knowledge gain in emotion regulation and the IT program entailed a significant knowledge increase in self-regulated learning. However, the expected co-increase in emotion regulation knowledge in the IT group did not reach significance.

Although the integrated training program did not significantly increase knowledge on emotion regulation, participants in this group did report to actually use more emotion regulation after training, in line with our hypotheses. Surprisingly, the emotion regulation-only program was less effective in promoting emotion regulation use although more time and practice was spent on the topic in this program and a knowledge gain was observed. As expected, the control program did not affect the examined outcomes.

In detail, the integrated training program promoted the use of Situation analysis and Strategy development. This suggests that the program helped participants to engage more with reflection on the emotion-eliciting situation and to think of ways and take actions to alter their emotions. Since this scale (Scheibe, 2009) mainly refers to Gross' (1998) emotion regulation sets of situation selection and situation modification, the result indicates that these emotion regulation forms were successfully promoted by the integrated training program.

Interestingly, both the emotion regulation and the integrated training program did not succeed in increasing the use of Positive Perspective. This might be due to the relative difficulty of cognitive change strategies that involve positive emotion-regulatory goals (Scheibe & Schmitz, 2012, 2013). Probably, the interventions did not provide sufficient opportunity to practice and increase the use of Positive Perspective.

Neither Social Support, nor Cognitive Avoidance & Distraction, nor Suppression & Withdrawal were influenced by both interventions. These strategies were not trained in the present study since they have been observed to be linked with undesirable affective outcomes such as more negative/less positive academic affect and lower life satisfaction (Scheibe, 2009). The lack of changes in these nonequivalent dependent variables corroborates the differential effectiveness of both programs containing emotion regulation contents.

7.4.2. Self-regulated Learning was Increased by Integrated Program and Partly Supported by Emotion Regulation Program

Consistent with our expectations, self-regulated learning was effectively promoted by the integrated training program. Participants of the integrated program showed increases in all trained strategies. The control program did not cause changes in self-regulated learning, according to expectations. The emotion regulation program, as assumed, also exerted a certain influence on self-regulated learning although self-regulated learning strategies were not trained. There was a clear increase in motivation strategies which may be due to an overlap of the two concepts; e.g., focusing on interesting aspects of a task probably serves both emotion regulation and motivation regulation. Also, a tendency to engage more with planning and goal setting was found for participants of the emotion regulation program. Since this strategy was not trained and does not overlap with emotion regulation, this result is seemingly consistent with our assumption that higher self-control capacity may be responsible. However, as no increase in self-control capacity was observed in this group, the result cannot be interpreted in this way. More likely, the emotion regulation program supported planning and goal setting via the observed boost in motivation. Taken together, the pattern of effects (more motivation and a tendency of higher engagement with planning and goal setting) indicates that the emotion regulation training was primarily effective in the preaction phase of self-regulated learning, and is consistent with its effects on situation selection and modification. The action and postaction indicators of self-regulated learning might also have profited from the emotion regulation program if it had been more effective with respect to Positive Perspective.

7.4.3. Integrated Training Program Tended to Promote Self-control

The expectation that both the emotion regulation training program and the integrated program would promote self-control capacity could not be clearly confirmed. Interestingly, the integrated program did cause an increase tendency in self-control, but the emotion regulation program failed to do so while the control program expectedly did not affect self-control either. Since the emotion regulation training program was less effective in fostering the use of positive-oriented emotion regulation strategies, the absence of an effect on self-control capacity is consequential and in line with theory. If the tendency of the integrated training program to increase self-control is attributed to its effective support of positive-oriented

emotion regulation, this result can be interpreted to confirm that the use of positive emotion-regulatory goals entails benefits in self-control capacity (cf., Scheibe & Schmitz, 2012, 2013; Tice et al., 2007). Whether higher effectiveness in fostering the strategy of Positive Perspective would enlarge this gain in self-control capacity is to be examined in future research.

However, the slight increase in self-control in participants of the integrated training program might just as well be due to the increased use of self-regulated learning strategies and be unrelated to changes in positive-oriented emotion regulation. This interpretation would be inconsistent with the conception that all kinds of self-regulatory acts, including use of self-regulated learning strategies, draw on a limited resource (Baumeister & Heatherton, 1996). Since we did not include an intervention that exclusively trains self-regulated learning, we cannot clearly rule out this explanation.

7.4.4. Limitations and Suggestions for Future Research

In order to give indications for future research we consider some limitations of the present research. An issue of the study was that although the deployed measure of emotion regulation strategies (Scheibe, 2009) was perfectly tailored to the specific context of learning and achievement and to the target group of secondary school students, it only partly mapped the trained emotion regulation strategies. Since some scales integrate different, more specific emotion regulation strategies such as increasing bodily relaxation or focusing attention on interesting aspects of a task, possible increases in these specific strategies might have been present but could not be detected by the used instrument. Future intervention studies should consider the use of scales that better match and differentiate as exactly as possible the trained strategies. To attain this, a combination of different existing scales will most likely be necessary (e.g., for cognitive change strategies: CERQ by Garnefski & Kraaij, 2007; for reaction modulation strategies ERQ by Gross & John, 2003; for situation modification, cognitive change strategies: Scheibe, 2009), and supplementary new scales should be developed for situation selection and attentional deployment strategies. Special attention should be given to measuring the aspect of positive up-regulation which will necessitate adaptations of instruments. Additional objective data (e.g., academic achievement/grades) would support the results drawn from self-report data in future studies. Another issue was the lack of clarity how the observed change in self-control capacity should be interpreted. An additional experimental condition consisting in a pure self-regulated learning training program could clarify the source of such self-control capacity gains. Finally, the interventions

examined in this study failed to effectively foster the use of positive perspective, possibly due to a lack of practice. Since positive perspective can be considered a key strategy when it comes to positive emotion-regulatory goals, future interventions should try to selectively train fewer strategies with increased practice time for each strategy.

7.4.5. Conclusion

The present study demonstrates that teaching emotion regulation strategies that employ positive emotion-regulatory goals makes a valuable contribution to programs that foster self-regulated learning in secondary school students. The findings demonstrate that the integration of emotion regulation contents resulted in an effective program that promotes both self-regulated learning and emotion regulation skills as a part of successful academic self-regulation, being even superior to a pure emotion regulation program. The present program broadens existing emotion regulation intervention approaches by training positive-oriented emotion regulation for the full range of emotion regulation strategies described in the literature (cf., Gross, 2015). The study further provides first evidence that programs integrating positive-oriented emotion regulation could be able to strengthen students' self-control capacity that is inter alia linked with desirable outcomes such as emotional well-being, academic performance, health behavior, and relationship quality (de Ridder et al., 2012). More research is needed on the differential effects of emotion regulation interventions in the academic context. In particular, examining short- and longer-term effects on academic emotional functioning and success as well as phase-specific effectiveness of emotion regulation strategies in the learning process will be promising next steps.

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7.6. Appendix

Overview of training programs

	Training program		
Session	Integrated training program	Emotion regulation training program	Control training program
1st session	• Process and components of self-regulated learning (SRL) • Goal setting (SRL) • Academic emotions, effects on learning and achievement (ER) • Causes of emotions (ER)	• Components and functions of emotions • Academic emotions, effects on learning and achievement • Identification and differentiation of own emotions • Causes and generation of emotions	• Learning types • Overview of cognitive learning techniques • Organization strategies
2nd session	• Planning, situation selection and modification (INT) • Concentration, attentional deployment (INT) • Reaction modification, quick relaxation exercises (ER)	• Effectiveness of emotion regulation strategies in learning situations • Situation modification • Attentional deployment • Cognitive change	• Elaboration strategies • Critical examination strategies

3rd session	• Motivation (INT) • Cognitive Change (ER) • Transferring strategy knowledge to a specific learning situation (INT)	• Transferring strategy knowledge to a specific learning situation • Response modulation	• Repetition strategies, working memory • Knowledge use strategies • multimodal learning, breaks, utilization of circadian rhythm and sleep

Note. ER = emotion regulation contents; SRL = self-regulated learning contents; INT = contents that integrates emotion regulation and self-regulated learning.

III. PART 3: APPENDICES

Contents

8. Appendix for Manuscript A

8.1. Appendix A1: Learning Task (German)

Lernaufgabe:

Liebe Teilnehmerin, lieber Teilnehmer,

als nächstes erhalten Sie Lernmaterial. Wir möchten untersuchen, wie effektiv Sie lernen können. Am Ende der Studie gibt es einen Abschlusstest zum Themengebiet „Malta“.

Sie haben jetzt 15 Minuten Zeit, sich mit dem Lernmaterial zu beschäftigen.

Die Bearbeitung der Aufgabe 1 ist dabei für alle Pflicht. Das Bearbeiten der anderen Aufgaben ist freiwillig – sie können Ihnen aber später dabei helfen im Abschlusstest eine bessere Punktzahl zu erreichen.

Wichtig: Sie können sich Ihre Zeit völlig frei einteilen – d.h. entscheiden Sie selbst, wann Sie anfangen und wann Sie aufhören zu lernen.

Haben Sie keine Lust mehr zu lernen oder möchten Sie etwas anderes machen als zu lernen, können Sie die Zeit, bis ich wieder komme, ebenso für etwas anderes nutzen – es liegen verschiedene Zeitschriften aus.

Aufgaben:
Pflicht:
P1) Basiswissen über Malta

Freiwillig:
F1) Klima
F2) Sprache
F3) Religion
F4) Die Maltesische Küche
F5) Tauchen auf Malta
F6) Geografie

Bitte der Reihenfolge nach bearbeiten.

Wichtig:

1. Haben Sie einen Unterpunkt gelernt, so machen Sie bitte ein Kreuz in das entsprechende Fenster am Ende der jeweiligen Seite.
2. Halten sie unbedingt die Reihenfolge der Aufgaben ein – d.h. gehen Sie bitte erst zur nächsten Aufgabe weiter, wenn Sie die vorangestellte Aufgabe bearbeitet haben. Dies ist wichtig für die Vergleichbarkeit der Untersuchungsergebnisse.
3. Teilen Sie sich Ihre Zeit frei ein. Entscheiden Sie selbst, *wann*, *wie viel und wie lange* Sie lernen möchten.
4. Nur Aufgabe 1 (Basiswissen über Malta) ist für alle Pflicht.

	Beginnen Sie jetzt mit dem Lernen.

Pflichtaufgabe 1:

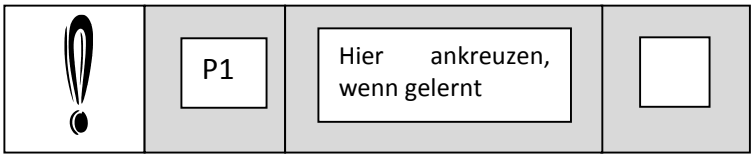
P1) Basiswissen: Fakten über Malta

Republik Malta	
Die Republik Malta verteilt sich auf 3 Inseln	Malta Gozo Comino
Hauptstadt	Valetta
Fläche	316 km²
Einwohnerzahl	410.000
Währung	Euro
Amtssprache	Maltesisch, Englisch
Telefonvorwahl	+356

Die Republik Malta ist ein südeuropäischer Inselstaat im Mittelmeer. Der maltesische Archipel verteilt sich auf die drei bewohnten Inseln Malta (246 km²), Gozo (67 km²) und Comino (3 km²) sowie auf die unbewohnten Inseln Cominotto, Filfla, St. Paul's Islands und Fungus Rock.

Die Hauptinsel Malta ist in zwei Regionen mit fünf Bezirken gegliedert. Gozo und Comino bilden zusammen die dritte Region und den sechsten Bezirk. Der Name stammt von der punischen Bezeichnung für Zufluchtsort „malet", die Griechen nannten die Inseln Melite, bei den Römern hieß sie Melita.

Malta wurde am 21. September 1964 vom Vereinigten Königreich unabhängig. Am 1. Mai 2004 wurde es Mitglied der Europäischen Union und ist seitdem ihr kleinster Staat. Zum 1. Januar 2008 wurde in Malta der Euro eingeführt.



Freiwillige Aufgabe 1:

F1) Klima:

Auf Malta herrscht subtropisches, trockenes Mittelmeerklima. Dieses ausgeglichene Seeklima ist von milden, feuchten Wintern und trockenen, warmen, aber nicht übermäßig heißen, Sommern geprägt. Die jährliche Niederschlagssumme beträgt auf den Inseln gut 550 Millimeter, wobei der geringste Niederschlag mit gegen Null tendierenden Werten im Sommer – speziell im Juni und Juli – und der meiste im Winter zu verzeichnen ist. Der Regen zieht zumeist kurz und heftig über das Land, wohingegen Dauerregen unüblich ist. Die Luftfeuchtigkeit auf Malta liegt im Sommer bei durchschnittlich 74 Prozent.

Wie für Insellagen typisch, sind die täglichen Temperaturunterschiede mit fünf bis zehn Grad Celsius zumeist sehr gering. Die höchsten Temperaturen werden in den Sommermonaten Juli und August erreicht, in denen die Durchschnittswerte auf bis zu 26 Grad ansteigen.

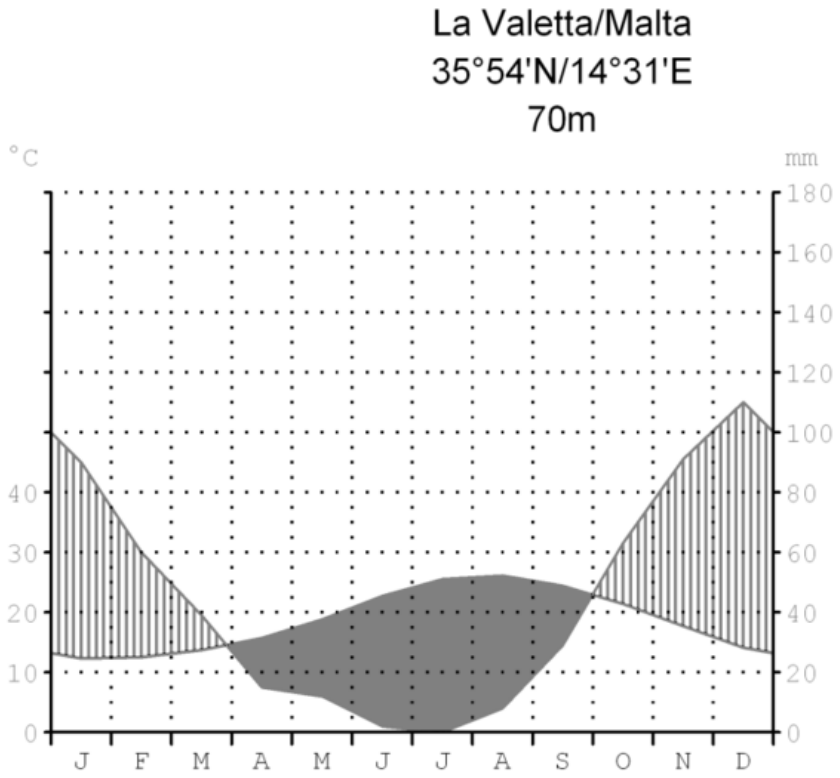


Abbildung 1. Klimadiagramm der Hauptstadt Valetta.

!	F1	Hier ankreuzen, wenn gelernt	☐

Freiwillige Aufgabe 2:

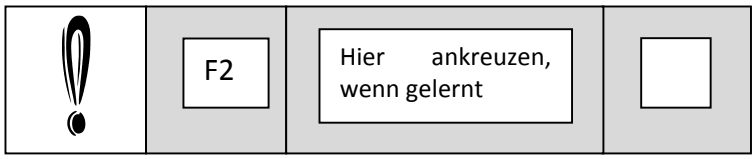
F2) Sprache:

Trotz der langen Zugehörigkeit zum britischen Weltreich, das auch das Englische auf Malta einführte, haben die Malteser ihre eigene Sprache bewahrt. Maltesisch ist neben Englisch maltesische Staatssprache und infolge der EU-Mitgliedschaft dementsprechend auch in der EU Amtssprache.

Maltesisch zählt zu den semitischen Sprachen und hat sich aus einem arabischen Dialekt entwickelt. Hieraus erklärt sich das auf den ersten Blick erstaunliche Faktum, dass die überwiegend katholischen Malteser zu „Alla“ beten – wie christliche Araber, denn das Wort bedeutet „Gott“. Aber auch größere Wortschatzanteile aus dem Italienischen sowie geringere aus der spanischen, französischen und englischen Sprache finden sich im Maltesischen wieder. Als einzige semitische Sprache verwendet das Maltesische lateinische Schriftzeichen (ausgenommen das Y und C) erweitert um vier Sonderzeichen.

Aufgrund der langen britischen Kolonialzeit beherrschen aber fast alle Malteser auch die englische Sprache, die als zweite Amtssprache in Malta und wegen der seltenen Übersetzungen von Büchern und Filmen ins Maltesische stetig an Bedeutung gegenüber dem Maltesischen zunimmt.

Kenntnisse des Italienischen sind ebenfalls weit verbreitet; nicht zuletzt aufgrund der Beliebtheit italienischer Fernsehprogramme. Bis 1934 galt das Italienische auf Malta auch als Gerichts- und Verwaltungssprache.



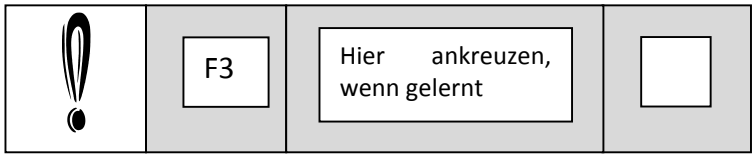
Freiwillige Aufgabe 3:

F3) Religion

Die Mehrheit der maltesischen Bevölkerung (98 %) ist römisch-katholisch. Daneben gibt es nur einige wenige Protestanten, Orthodoxe, Juden und Muslime. Das historische Valletta hatte einen kleinen jüdischen Wohnbezirk.

Die katholische Kirche hat einen starken Einfluss auf die maltesische Politik, so sind beispielsweise Ehescheidungen nicht möglich, Schwangerschaftsabbruch ist strafbar und „oben ohne“ zu baden verboten. Es soll 365 katholische Kirchen in Malta geben (wohl eine symbolische Zahl); aufgrund dieser Tatsache sagen Malteser oft, sie hätten eine Kirche für jeden Tag im Jahr.

Der Katholizismus ist in der Verfassung des maltesischen Volkes als Staatsreligion verankert und wird auch von sehr großen Teilen der Bevölkerung gelebt. Ein äußeres Zeichen dafür sind neben Hausaltären Bilder von Heiligen, Bischöfen und Pfarrern, die in Gebäudefronten gemeißelt und farbenfroh verziert sind.



Freiwillige Aufgabe 4:

F4) Die Maltesische Küche

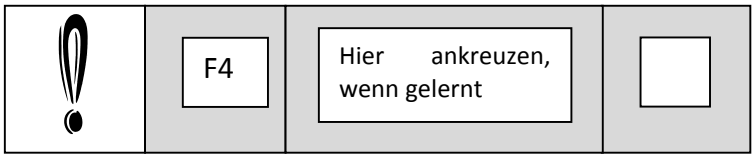
Die Maltesische Küche gehört zu den mediterranen Küchen und wurde deutlich von der englischen sowie der italienischen Küche beeinflusst. Bei den verwendeten Gewürzen spürt man ein starkes nordafrikanisches Element.

Da Fleisch auf der Felseninsel rar ist, werden vorwiegend Gemüse und Fisch verwendet. Im Sommer und Herbst zur Fangzeit der Goldmakrele (Coryphaena hippurus), findet man überall auf Malta diesen, dort „Lampuki" genannten Fisch auf den Speisekarten. Der „Lampuki" ist der Nationalfisch Maltas und wurde auf Malteser Münzen geprägt.

Die beliebtesten Fleischgerichte der Inseln werden aus Kaninchen („Fenek“) zubereitet.

Das noch vor einigen Jahren äußerst beliebte Schießen und Verspeisen von Zugvögeln hat ein wenig nachgelassen, da es dort so gut wie keine mehr gibt. Der berühmte „Malteser Falke“ landete bis zum letzten Vogel in den Mägen der Insulaner und wurde seitdem nie mehr gesehen.

Die Küche ist sehr gemüseorientiert (Tomaten, Zucchini, Bohnen, Erbsen, Möhren, Zwiebeln, Paprika, Spinat, Artischocken und mittelmeeruntypisch Kohl und Blumenkohl) und schätzt, wie fast alle Mittelmeerküchen, Oliven, Olivenöl und Brot.



Freiwillige Aufgabe 5:

F5) Tauchen auf Malta:

Mit seinen Felsküsten und dem klaren Wasser gilt der maltesische Archipel als ideales Tauchrevier. Die Tauchspots sind leicht zugänglich und auf Grund der kurzen Distanzen schnell zu erreichen. Alle drei Inseln bieten ausgezeichnete, einzigartige Taucherlebnisse mit Riffen, Höhlen und Wracks, die das Tauchrevier zu einem der interessantesten des Mittelmeeres machen.

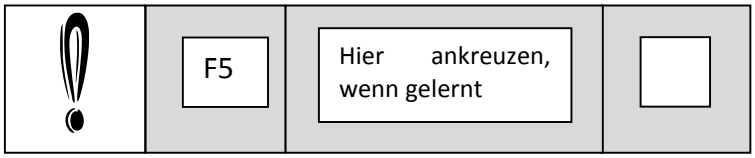
Der weithin steinige Meeresgrund und die minimalen Gezeiten garantieren auch in größeren Meerestiefen ausgezeichnete Unterwassersicht, was Malta zum optimalen Revier für Einsteiger und Anfänger macht. Für Fortgeschrittene gibt es verschiedene Tauchstellen, die mit archäologischen Artefakten aus dem 2. Weltkrieg oder sogar aus der Römerzeit aufwarten.

Die Wassertiefe variiert vom seichten 12m tiefen Ghar Lapsi bis zum Laternenpunkt, wo ein Unterwassertunnel die Taucher bis weit über 50 m in die Tiefe hinunterführt.

Es gibt verschiedene Arten von Tauchkursen und –aktivitäten, die von zugelassenen örtlichen Tauchschulen angeboten werden. Die Taucher müssen vor jeglichen Tauchaktivitäten eine medizinische Untersuchung absolvieren, um ihre Eignung zum Tauchen nachzuweisen. Alle Schulen bieten den Dienst eines Taucharztes an, und die Kosten dafür liegen selten über €20. Atteste aus anderen Ländern werden akzeptiert, solange dem Tauchzentrum eine gültige Kopie vorlegt wird.

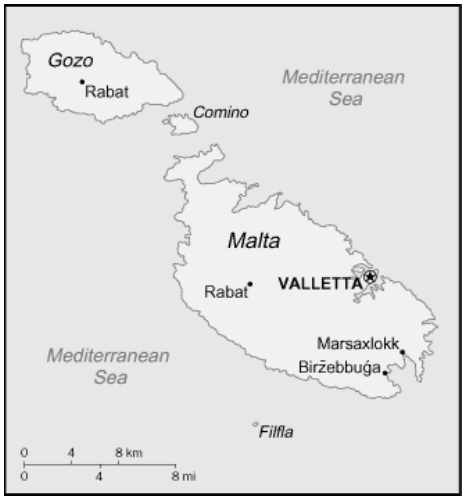
Taucher, die ohne Begleitung einer Tauchschule tauchen wollen, müssen einen Tauchpartner haben und den PADI Advanced Open Water Tauchschein oder ein Äquivalent einer anderen Agentur vorweisen. Es ist immer empfehlenswert, sich beim Tauchzentrum über die aktuelle Wetterlage und die besten Tauchplätze zu informieren.

Je nach Schule kosten die Open Water- Einsteigekurse zwischen €280 und €360.



Freiwillige Aufgabe 6:

F6) Geografie:



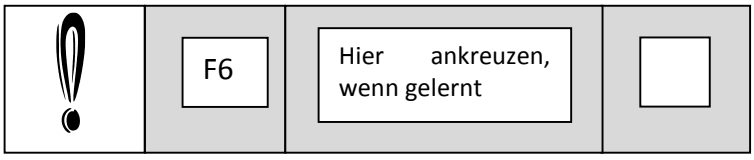
Malta zählt mit einer Fläche von 316 Quadratkilometern zu den sogenannten Zwergstaaten, ist etwas kleiner als die Stadt Bremen und knapp doppelt so groß wie Liechtenstein. Der Archipel liegt 81 Kilometer südlich der Küste Siziliens in der Kleinen Syrte des Mittelmeeres, 350 km nördlich der libyschen Hafenstadt Al Khums, 150 km nordöstlich von Lampedusa und ungefähr 285 km südöstlich der tunesischen Halbinsel Cap Bon; er ist neben Zypern das einzige Land der Europäischen Union, das zur Gänze südlich des 37° Breitengrades liegt.

Die Hauptinsel Malta (mlt. Malta) ist 246 km² groß, schräg gen Südosten ausgerichtet und erreicht eine Länge von 28 und eine maximale Breite von 13 Kilometern. Zwischen ihrem nordwestlichen Ende und der zweiten Hauptinsel Gozo (mlt. Għawdex) erstreckt sich der 4,4 km weite Gozokanal, in dem die 2,7 km² große Insel Comino (Kemmuna) sowie das unbewohnte Felseneiland Cominotto (mlt. Kemmunett) liegen. Gozo ist nahezu waagerecht ausgerichtet, misst 14,3 km in der Länge, bis zu 7,25 km in der Breite und hat eine Oberfläche von insgesamt 67 km². Die weiteren – sämtlich unbewohnten – Inseln des Staates sind das 4,4 km südlich Maltas gelegene Filfla (mlt. Filfla) und die Saint Paul's Islands (malt.: Il-Gżejjer ta' San Pawl) am nördlichen Ende der St. Paul's Bay, die 83 Meter vor der Küste liegen und tatsächlich zusammenhängen, deren Verbindungsstück bei rauer See allerdings überspült werden kann. Im Westen Gozos, an der Schwarzen Lagune nahe dem Dwejra Point ragt der 60 Meter hohe Fungus Rock (mlt. Il-Ġebla tal-Ġeneral) aus dem Meer, ein großer Kalksteinfelsen. Manoel Island (mlt. Il-Gżira Manwel) im Marsamxett Harbour zwischen Valletta und Sliema wird gemeinhin nicht mehr zu den Inseln gezählt, da sie über einen Damm und eine Straße mit dem Festland verbunden ist.

Das charakteristischste geographische Merkmal Maltas ist die Verschiedenheit seiner Küstenlinien, was sich besonders auf der Hauptinsel offenbart. Sind die Ost- und die Nordostseite von flachen Stränden und weiten Buchten wie beispielsweise der Marsaxlokk Bay, dem Marsamxett Harbour, dem Grand Harbour, der Mellieħa Bay und der St. Paul's Bay geprägt, finden sich im Südwesten und Norden sehr scharf gezeichnete Küstenabschnitte mit Felsformationen und grottenähnlichen Einschnitten. Auf dieser Seite erhebt sich Malta sehr schroff aus dem Meer und bildet langgezogene Steilküsten, die an den Dingli Cliffs im Ta' Dmejrek

kulminieren, der mit 253 Metern höchsten Erhebung des Landes. Weitere Karsthöhenzüge finden sich im Nordwesten mit der Mellieħa Ridge, der Bajda Ridge und der bekannten, bis zu 122 m hohen Marfa Ridge. Die höchsten Erhebungen Gozos messen 127 Meter.

Auf Grund der extremen Wasserarmut existieren auf Malta, Gozo und Comino keine permanenten Flüsse. Nach starken Niederschlägen im Winter können sich allerdings einige ausgetrocknete Bachbetten temporär mit Regenwasser füllen. Diese zumeist kleinen Rinnsale finden sich in engen Felsentälern, so genannten Wieds, wo sie nicht so schnell wieder verdunsten. Der längste dieser zeitweiligen Bachläufe ist jener durch das Wied l-Għasri, der an der Nordküste Gozos in eine fjordähnliche Meeresbucht abfließt. Der einzige größere See des Archipels ist künstlich angelegt und befindet sich innerhalb des Ghadira Nature Reserve auf der Landenge vor der Marfa Ridge knapp 2 km nordwestlich von Mellieħa. Er misst 350 mal 220 m und besitzt zahlreiche Binneninseln.



8.2. Appendix A2: Self-report Measures (German)

8.2.1. Positive and Negative Emotions Adjective List

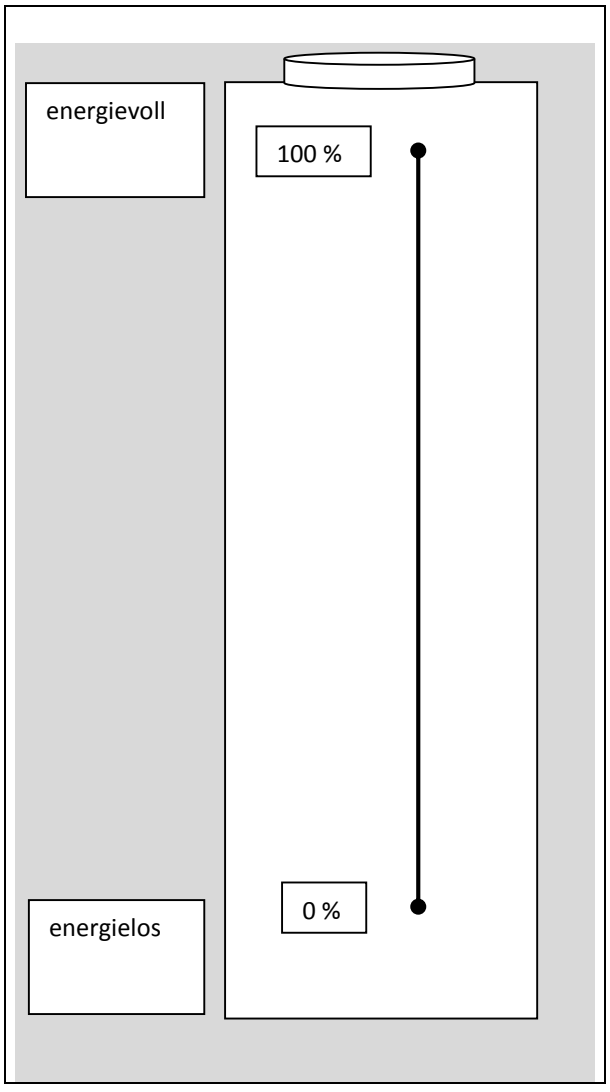
Geben Sie bitte an, wie Sie sich *<u>im Moment</u>* fühlen:

1. ***Setzen Sie auf <u>jeder</u> zugehörigen Linie an der Stelle einen Strich, welche am ehesten die momentane Intensität der Emotion widerspiegelt.***
2. ***Je weiter rechts Sie den Strich setzen, desto eher trifft diese Emotion im Augenblick auf Sie zu.***
3. ***Start- und Endpunkt dürfen mitbenutzt werden.***
4. ***Geben Sie die wahrgenommene Intensität <u>aller</u> Emotionen an.***

aktiv	**Gar nicht**	**äußerst**
traurig	**Gar nicht**	**äußerst**
interessiert	**Gar nicht**	**äußerst**
ängstlich	**Gar nicht**	**äußerst**
stolz	**Gar nicht**	**äußerst**
gelangweilt	**Gar nicht**	**äußerst**
beschämt	**Gar nicht**	**äußerst**
hoffnungsvoll	**Gar nicht**	**äußerst**
erschrocken	**Gar nicht**	**äußerst**
freudig erregt	**Gar nicht**	**äußerst**
nervös	**Gar nicht**	**äußerst**
entschlossen	**Gar nicht**	**äußerst**
verärgert	**Gar nicht**	**äußerst**
sicher	**Gar nicht**	**äußerst**
enttäuscht	**Gar nicht**	**äußerst**
durcheinander	**Gar nicht**	**äußerst**

8.2.2. Availability of Self-Control Resources Visual Analogue Scale

	**Bitte geben Sie nun an, wie *energievoll* Sie sich <u>momentan</u> fühlen. Setzen Sie dafür ein Kreuz auf den vorgegebenen Strich.** ***Start und Endpunkt dürfen mitbenutzt werden.*** **Je energievoller Sie sich fühlen, desto weiter oben setzen Sie das Kreuz.**



8.2.3. Instruction Effectiveness

Dieser Fragebogen enthält eine Reihe von Aussagen. Lesen Sie jede Aussage durch und kreuzen Sie dann an, wie stark Sie dieser Aussage zustimmen. Sie haben die Möglichkeit, zwischen fünf Abstufungen zu wählen.

Bitte machen Sie einige Angaben, bevor es mit der Lernaufgabe weitergeht:

Je weiter rechts Sie ankreuzen, desto eher stimmen Sie der Aussage zu.

		Trifft überhaupt nicht zu	Trifft ein wenig zu	Teils/teils	Trifft überwiegend zu	Trifft Genau zu
	Mir ist es schwer gefallen, der Aufgabenstellung während des Films zu folgen.	○	○	○	○	○
	Mir ist es gelungen, *mir während des Films positive Aspekte bewusst zu machen.* **(reappraisal group)** / *während des Films meine Emotionen nicht nach außen hin zu zeigen.* **(suppression group)** / *während des Films meinen Emotionen freien Lauf zu lassen und diese nicht zu regulieren*. **(control group)**	○	○	○	○	○
	Bitte schätzen Sie: In wie viel Prozent der Filmdauer ist es Ihnen gelungen, *sich positive Aspekte bewusst zu machen?* **(reappraisal group)** / *Ihre Emotionen nicht nach außen hin zu zeigen?* **(suppression group)** / *Ihren Emotionen freien Lauf zu lassen und diese nicht zu regulieren?* **(control group)**	**_____ (bitte eintragen 0-100 Prozent)**				

8.2.4. Indicators of Self-regulated Learning

Post-film assessment: self-efficacy.

		Trifft überhaupt nicht zu	Trifft ein wenig zu	Teils/teils	Trifft überwiegend zu	Trifft genau zu
	Schwierigkeiten beim Lernen sehe ich heute gelassen entgegen, weil ich meinen Fähigkeiten immer vertrauen kann.	○	○	○	○	○

	Wenn ich heute beim Lernen mit einer neuen Sache konfrontiert werde, werde ich schon damit zurechtkommen.	○	○	○	○	○
	Wenn gleich beim Lernen schwierige Probleme auf mich zukommen, wird mir die Lösung gelingen, wenn ich mich darum bemühe.	○	○	○	○	○

Post-learning assessment: effort, intrinsic motivation, extrinsic motivation, outcome, effective learning time, satisfaction with outcome.

Dieser Fragebogen enthält eine Reihe von Aussagen. Lesen Sie jede Aussage durch und kreuzen Sie dann an, wie stark Sie dieser Aussage zustimmen. Sie haben die Möglichkeit zwischen fünf Abstufungen zu wählen.

Bitte beantworten Sie anhand folgender Aussagen, wie Sie das Lernen wahrgenommen haben:

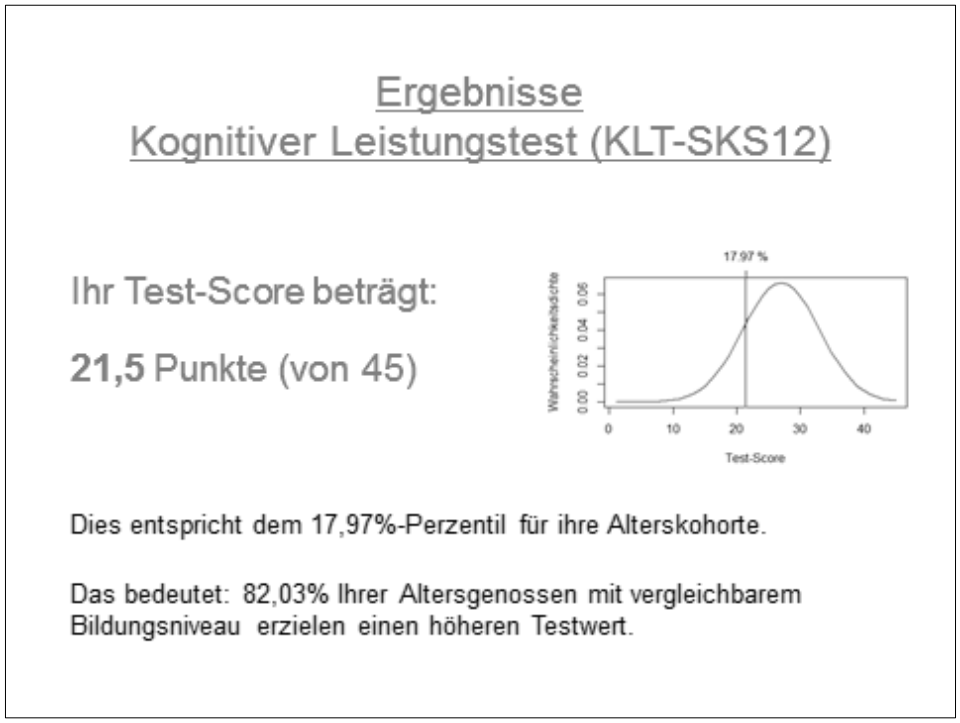
Je weiter rechts Sie ankreuzen, desto eher stimmen Sie der Aussage zu.

		Trifft überhaupt nicht zu	**Trifft ein wenig zu**	**Teils/teils**	**Trifft überwiegend zu**	**Trifft Genau zu**
	Ich habe mich beim Lernen angestrengt.	○	○	○	○	○
	Ich fand das Thema, über das ich lernen sollte, spannend.	○	○	○	○	○
	Ich habe gelernt, um später im Test gut abzuschneiden.	○	○	○	○	○
	Wie viel der Zeit, die Sie für das Lernen verwendet haben, haben Sie effektiv gelernt (in Prozent)?	**_____ (bitte eintragen 0-100 Prozent)**				
	Ich bin heute mit meinem Lernergebnis zufrieden.	○	○	○	○	○

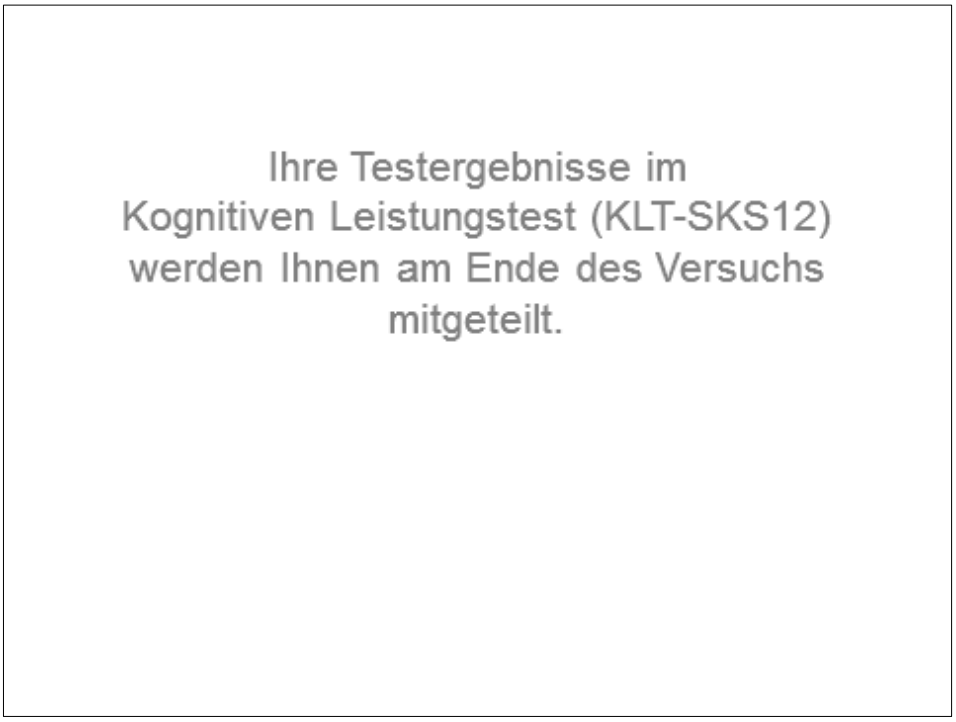
9. Appendix for Manuscript B

9.1. Appendix B1: Instructions Failure Feedback / No Treatment (German)

9.1.1. Failure Feedback Instruction



9.1.2. No Treatment Instruction

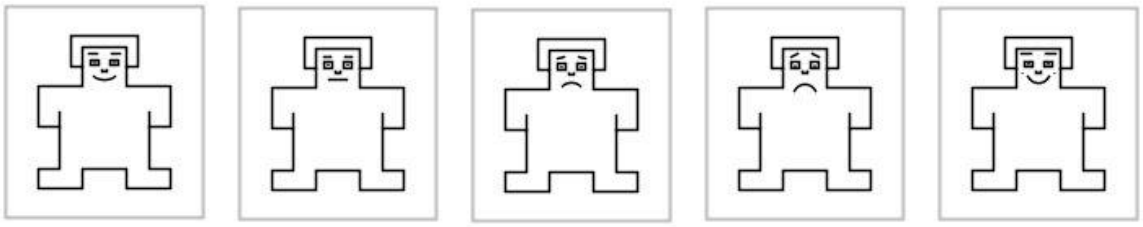


9.2. Appendix B2: Self-report Measures (German)

9.2.1. State Affect

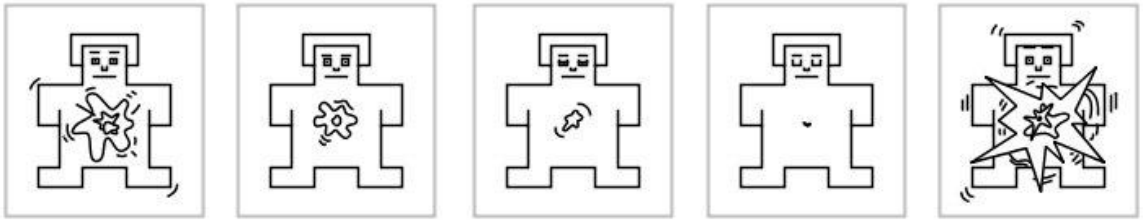
Valence.

Bitte geben Sie an, wie Sie sich IM MOMENT fühlen und klicken Sie auf das entsprechende Bild. Bitte wählen Sie pro Zeile nur EINE Figur aus.



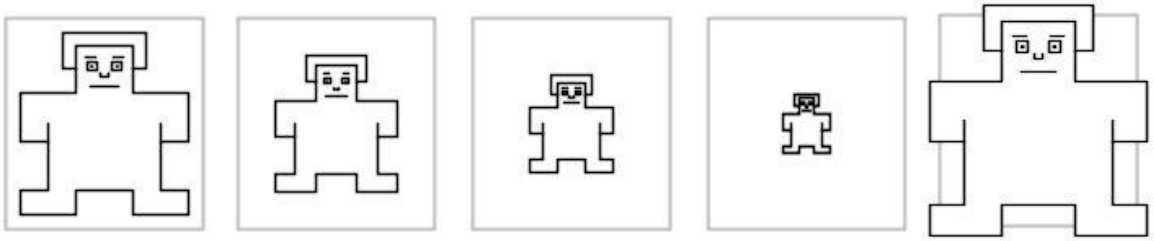
Arousal.

Bitte geben Sie an, wie Sie sich IM MOMENT fühlen und klicken Sie auf das entsprechende Bild. Bitte wählen Sie pro Zeile nur EINE Figur aus.



Dominance.

Bitte geben Sie an, wie Sie sich IM MOMENT fühlen und klicken Sie auf das entsprechende Bild. Bitte wählen Sie pro Zeile nur EINE Figur aus.



9.2.2. State Perceived Self-control

Beantworten Sie bitte die folgenden Aussagen zu Ihrem momentanen Befinden. Es geht nicht um Ihr übliches Befinden, sondern darum, wie Sie sich jetzt, d. h. in diesem Moment fühlen. Kreuzen Sie jeweils eine Zahl zwischen 1 und 7 an, um auszudrücken, wie sehr die jeweilige Aussage im Moment auf Sie zutrifft.

	völlig unzu-treff-end (1)	2	3	4	5	6	trifft ganz genau zu (7)
1. Ich brauche etwas Angenehmes, um mich besser zu fühlen.	○	○	○	○	○	○	○
2. Ich fühle mich erledigt.	○	○	○	○	○	○	○
3. Wenn ich im Augenblick durch etwas in Versuchung geführt würde, würde es mir sehr schwer fallen, zu widerstehen.	○	○	○	○	○	○	○
4. Ich würde jede schwierige Aufgabe, die mir gestellt würde, aufgeben wollen.	○	○	○	○	○	○	○
5. Ich fühle mich ausgeglichen.	○	○	○	○	○	○	○
6. Ich kann keine Information mehr aufnehmen.	○	○	○	○	○	○	○
7. Ich fühle mich antriebslos.	○	○	○	○	○	○	○
8. Ich fühle mich wach und konzentriert.	○	○	○	○	○	○	○
9. Ich möchte aufgeben.	○	○	○	○	○	○	○
10. Ich fühle mich, als hätte ich keine Willenskraft mehr.	○	○	○	○	○	○	○
11. Mein geistiger Akku ist leer.	○	○	○	○	○	○	○

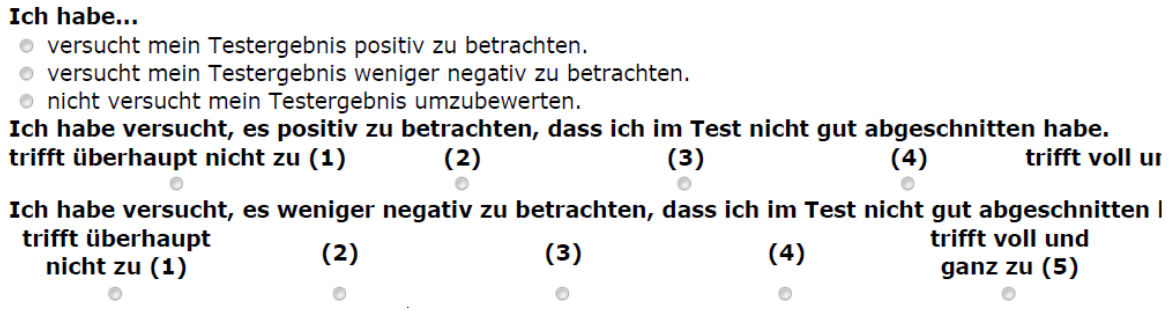
9.2.3. Manipulation Checks

Satisfaction with test result.

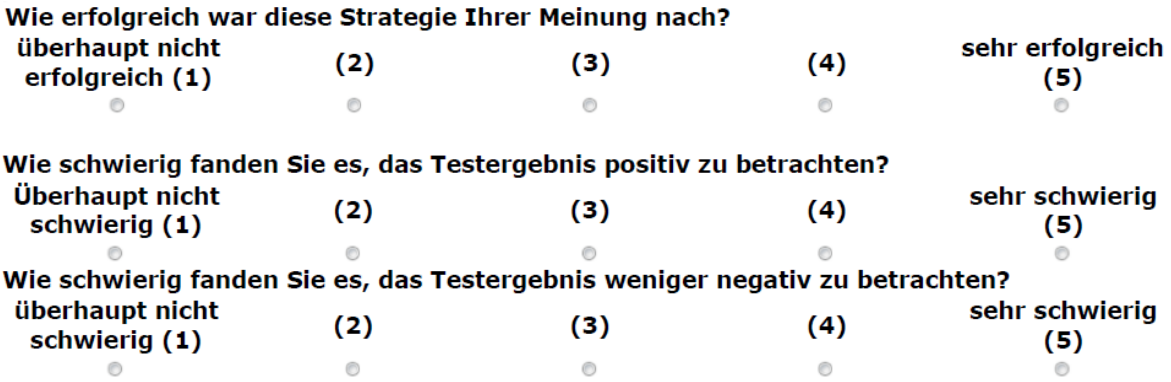
Ich war mit meinem Testergebnis ...

sehr unzufrieden (1)	2	3	4	sehr zufrieden (5)
○	○	○	○	○

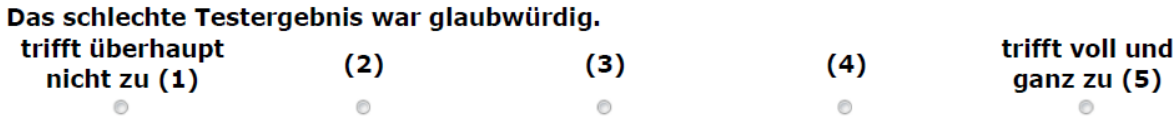
Compliance with emotion regulation instructions.



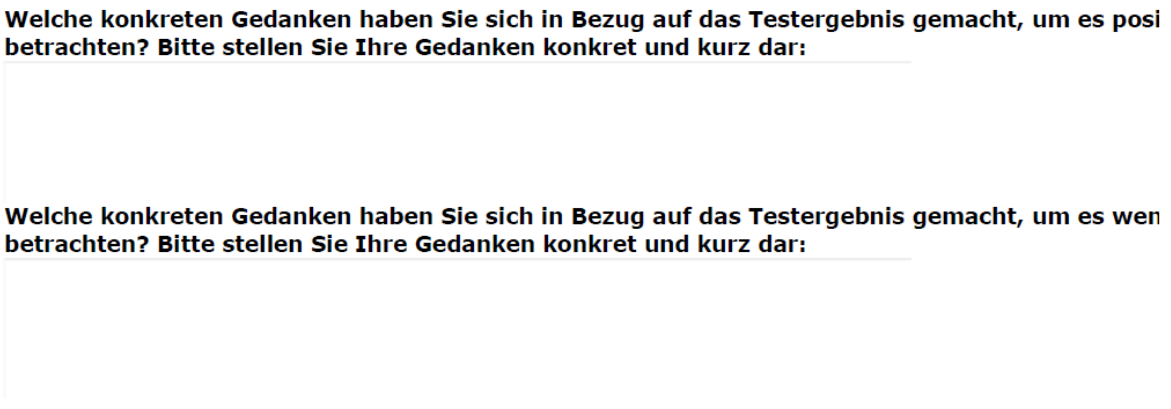
Perceived success and difficulty of emotion regulation.



Credibility of the test result.



9.2.4. Individual Reappraisal Techniques



10. Appendix for Manuscript C

10.1. Appendix C1: Training Programs (German)

10.1.1. Emotion Regulation Training Program: Sessions 1-3

Sequenzplan Emotionsregulations-Training 1

Zeit	Thema	Art	Sozialform / Methode	Ziel	Inhalt	Material
5	Begrüßung+ Vorschau		Plenum	Begrüßung + Vorschau auf den Workshop und die heutige Einheit geben		Workshopthemen auf Metaplan
15	Kennenlernen		Plenum	Auflockern, gegenseitiges Kennenlernen	Namensschilder erstellen lassen Jeder (inkl Trainer) sucht sich ein Baum-Bild heraus Vorstellung: Name, Hobby, warum welches Bild gewählt	Namensschilder, Bilder mit Bäumen Anwesenheitsliste
7	Einführung Emotionen und ER	Info + Interaktion	Plenum	Relevanz des Themas E erkennen, Funktionen von Emotionen kennen	Beispiele für Emotionen; Relevanz anhand von Beispielen verdeutlichen; Funktionen von Emotionen	Laptop, Beamer, ppt
8	Einführung Emotionen und ER	Reflexion	Plenums-diskussion	Wirkung von Lern- und Leistungsemotionen kennen und verstehen, warum ER manchmal nötig ist	Diskussion: Wie unterscheiden sich Qualität und Leistung während des Lernens in unterschiedl. Emotionalen Zuständen? Nutzen von ER allgemein und im Lernkontext? Einfluss von Emotionen auf das Lernverhalten?	
5	Emotionen beim Lernen	Reflexion	Plenum	Lern- und Leistungsemotionen kennen	Trainer sammelt und ordnet nach Valenz, Bezug und Zeitpunkt	Flip-Chart Marker/Stifte
5	Emotionen beim Lernen	Info	Plenum	Einflüsse von Emotionen auf Lernen und Leistung kennen	Emotionen beeinflussen das Lernen und Leisten via Motivation, Lernstrategien, kognitive Ressourcen, Informationsverarbeitung	Laptop, Beamer, ppt
5	PAUSE					
5	Emotionen erkennen	Info	Plenum	Wissen, warum es wichtig ist, Emotionen erkennen zu können und worauf es dabei ankommt	Abstand, Differenzieren, Benennen Pos. und neg. Emotionen erkennen und deren Auswirkungen kennen	Laptop, Beamer, ppt

5	Auslöser von Emotionen	Info	Plenum	Gedanken als veränderbare Emotion-sauslöser erkennen; Verbindung zwischen Situation, Gedanken und Emotion verstehen	Bewertungen als Emotionsauslöser Veränderbarkeit dieser Bewertung (Gedanken) Prozessmodell der Emotionsentstehung und dementsprechende ER-Ansatzpunkte	Laptop, Beamer, ppt,
15	ER – erster Einblick	Reflexion/ Übung	Einzel + Plenum	bisher bekannte Möglichkeiten der Emotionsregulation vergegenwärtigen und hinsichtlich ihres Nutzens reflektieren	jeder Schüler soll 3-4 Strategien aufschreiben, die er kennt/ schon angewendet hat im Anschluss stellen Schüler die Strategien vor und sortieren nach hilfreich/nicht hilfreich	Metaplan-Karten, div. Marker/Stifte
5	Blitzlicht und Verabschiedung				Hinweis Hausaufgabe	Arbeitsblatt ‚Hausaufgabe', Handout
90						

Sequenzplan Emotionsregulations-Training 2

Zeit	Thema	Art	Sozialform / Methode	Ziel	Inhalt	Material
5	Begrüßung					
5	Rückblick	Info	Plenum	Wiederholung der letzten Stunde	Rückblick und kurze Besprechung Hausaufgabe	
10	Adaptivität der Strategien im Lernkontext	Reflexion/ Info	Plenums-diskussion	Förderliche und hinderliche Strategien unterscheiden können	Aufgreifen einzelner in der letzten Einheit genannter Strategien (Metaplankarten) und Einteilung in lernförderliche und lernhinderliche Strategien zusammen mit den Schülern. Kurze Wiederholung Emotionsentstehungs-Prozessmodell u. wo die Strategien ansetzen können	Laptop, Beamer, ppt, Metaplankarten, Flip-Chart, Marker/Stifte
10	ER im Lernprozess-Einstieg	Reflexion	Plenums-diskussion	Wissen, welche Faktoren von außen und innen auf den Lernprozess einwirken können und welche Strategien hilfreich sein können	Wiederholung: Einfluss von Emotionen in allen Phasen des Lernens Welche Strategien sind in welcher Phase (vor, während, nach dem Lernen) sinnvoll? (Sammeln) Diskussion der Vorschläge	Metaplankarten, Metaplanwand, Pinnwandnadeln/ Tesa, Eddings
15	Situations-modifikation	Übung m. Reflexion	Kleingruppe + Plenum	Generieren von Situationsmodifikationsstrategien; nützliche Strategien identifizieren	pro Gruppe eine Vignette aus dem Lern- und Schulkontext: daheim beim Lernen, daheim bei Hausaufgaben, im Klassenzimmer, während einer Klassenarbeit, beim Lernen in der Gruppe, Schüler mit Prüfungsangst etc. Was genau ist passiert/ wie kann man die Situation verschlimmern (lernhinderliche Strategien)/ wie kann man die Situation verbessern (lernförderliche Strategien)? Reflexion der Übung im Plenum	Flip-Chart/ Tafel, div. Marker/Stifte Arbeitsblatt ‚Situationen'
5	PAUSE					
15	Aufmerksamkeits lenkung	Übung m. Reflexion	Einzelarbeit + Plenum	Ausnahmen und Erfolge fokussieren lernen (Ressourcenorientierung); Möglichkeiten der Aufmerksamkeitslenkung kennen; nützliche Strategien identifizieren	Ausnahmeninterview mit sich selbst: Wenn du einen Film ablaufen lässt über dein bisheriges Lernverhalten in dem Fach… Was von dem, was passiert ist, sollte weiterhin so geschehen? Wie kam es dazu? Wie hast du das geschafft? Welche Fähigkeiten haben dich das tun lassen? Angenommen, du möchtest das wiederholen – was müsstest du dafür tun? Reflexion der Übung im Plenum	Arbeitsblatt ‚Ausnahmen-interview'
5	Kognitive Veränderung	Übung	Plenum	Reframing üben und Erfahrung damit machen	Es wird über eine Situation gesprochen, die negative Emotionen hervorgerufen hat. Dabei versucht man den Eindruck zu reframen und positiv umzudeuten. Wie kann das auch in Lernsituationen hilfreich sein?	Situationsvignette
10	Kognitive Veränderung	Info + Reflexion	Plenum	Möglichkeiten der Umbewertung kennen	kognitive Veränderung, scheinbar ‚automatischer' Gedanken: Abstand, Umbewerten, Positive Selbstgespräche u.a.	
5	Blitzlicht, Verabschiedung				Hinweis Hausaufgabe	Handout, Arbeitsblatt ‚Hausaufgabe'
90						

Sequenzplan Emotionsregulations-Training 3

Zeit	Thema	Art	Sozialform / Methode	Ziel	Inhalt	Material
5	Begrüßung					
5	ER im Lernprozess	Info	Plenum	Wiederholung aller bisherigen Strategien	Kurzes Aufgreifen der bisherigen Themen: "Wie entsteht eine Emotion und wo kann ich Einfluss nehmen?"	
30	ER im Lernprozess	Übung	Kleingruppen + Plenum	Reflektieren + Anwenden aller bisherigen Themen	Übung ‚Riesenrad': Anhand verschiedener Situationsvignetten (je eine pro Gruppe) reflektiert jede Kleingruppe: - Identifizieren von Gedanken, Gefühlen und Körperreaktionen der Person in der Situation - Entwicklung geeigneter ER-Strategien aus den Bereichen Situationsmodifikation, Aufmerksamkeitslenkung und kognitive Veränderung Kleingruppen stellen Ergebnisse in der Großgruppe vor; anschließend Diskussion im Plenum.	Situationsvignette, FlipChart, Stifte
5	PAUSE					
5	Reaktions-modifikation	Info	Plenum	Möglichkeiten kennen, mit Emotionen umzugehen, wenn diese bereits voll entwickelt sind	Reaktionsmodulation: Komponenten der emotionalen Reaktion (Erleben, körperliche/physiologische Reaktion, Verhalten) und hilfreiche Strategien	
10	Reaktions-modifikation	Übung m Reflexion	Plenum	Einblick in PMR und deren Wirkung erhalten	Kurze Progressive Muskelrelaxation (PMR) Reflexion: Wie fühlt Ihr Euch jetzt? Könntet Ihr Euch vorstellen, dass so etwas helfen kann? Wenn ja, reicht es, wenn ich es nach Bedarf machen oder muss/sollte ich es regelmäßig machen?	PMR-Anleitung
15	Reaktions-modifikation	Übung	Einzelarbeit + Kleingruppen	schnelle Entspannungsstrategien kennen und anwenden	‚Quick Relaxation Exercises': jeder Schüler wählt für sich eine Strategie aus, Schüler finden sich nach gewählter Strategiewahl in Grüppchen zusammen und probieren sie aus. Reflexion und Festhalten der Erkenntnisse aus der Übung	Arbeitsblatt ‚Notfallstrategien'
5	Zusammenfassung	Info	Plenum	Wiederholung: Gesamtschau	Zusammenfassung aller Trainingsinhalte	
5	Planung ER-Strategieanwendung	Reflexion	Plenum	Vorsätze bilden, bestimmte ER-Strategien in Zukunft häufiger anzuwenden	Koffer packen: Was nehme ich aus dem Training mit?	
5	Abschluss u. Verabschiedung					
90						

10.1.2. Integrated Training Program: Sessions 1-3

Sequenzplan Kombitraining 1

Zeit	Thema	Art	Sozialform / Methode	Ziel	Inhalt	Material
5	Begrüßung+ Vorschau/Ablauf		Plenum	Begrüßung + Vorschau auf den Workshop und die heutige Einheit geben		Workshopthemen aller 3 Einheiten an Metaplanwand
15	Kennenlernen		Plenum	Auflockern, gegenseitiges Kennenlernen	Namensschilder erstellen lassen Jeder (inkl Trainer) sucht sich ein Baum-Bild heraus Vorstellung: Name, Hobby, warum welches Bild gewählt	Namensschilder, Bilder mit Bäumen Anwesenheitsliste
5	Einführung SRL	Info	Plenum	Wissen, was unter SRL zu verstehen ist, und welchen Nutzen es hat	Hintergrund zu Selbstreguliertem Lernen (SRL), Lernphasen, einfaches SRL-Modell	Laptop, Beamer, ppt
10	Ziele setzen	Info	Plenum	Wichtigkeit von Zielen erkennen und lernen, wie sie formuliert sein sollten	SMARTe Zielsetzung Nah- und Fernziele	Laptop, Beamer, ppt
20	Ziele setzen	Übung + Reflexion	Einzel+ Plenum	Fern- und Nahziele unterscheiden und die Formulierung üben	1 auf den schulischen Bereich bezogenes Fernziel setzen und 2 Nahziele (innerhalb der nächsten 3 Wochen zu erreichen) setzen Anschließend im Plenum an einem Beispiel eines Schülers besprechen, ob es SMART ist (am Flipchart)	Arbeitsblatt ‚Ziele setzen' und Aufgabe Nah-/Fernziel (ppt)
5	PAUSE					
10	Emotionen beim Lernen	Reflexion	Plenum	Lern- und Leistungsemotionen kennen	Welche Emotionen treten beim Lernen oder in Leistungssituationen auf? Trainer sammelt und ordnet nach Lernphasen-	Flipchart, Eddings
10	Emotionen beim Lernen	Info	Plenum	Einflüsse von Emotionen auf das Lern- und Leistungsverhalten kennen und verstehen	Emotionen beeinflussen das Lernen und Leisten via Motivation, Lernstrategien, kognitive Ressourcen, Informationsverarbeitung	Laptop, Beamer, ppt
15	Auslöser	Übung	Einzel/ Kleingruppe	Gedanken als Auslöser der Emotion erkennen	Anhand vorgegebener Gedanken überlegt und notiert sich jeder Schüler, welche Emotion durch diesen Gedanken ausgelöst werden könnten. Besprechung im Plenum	Arbeitsblatt , Gedanken und ihre Wirkung '
10	Zusammenfassung der Inhalte, Blitzlicht, Verabschiedung	Reflexion	Plenum			Handout
90						

Sequenzplan Kombitraining 2

Zeit	Thema	Art	Sozialform / Methode	Ziel	Inhalt	Material
5	Begrüßung					
5	Rückblick	Info	Plenum	Wiederholung der letzten Stunde	Rückblick und kurze Besprechung Hausaufgabe	
30	Planen der Lernhandlung & Situations-modifikation /ER)	Übung + Reflexion	Kleingruppen	durch gegenseitiges Lehren sollen die Inhalte besser verinnerlicht und verstanden werden.	3 Kleingruppen, jede erhält zu einem Thema Informationen, die sie bearbeiten soll: Zeitmanagement Lernumgebung Lernstrategien Die Kleingruppen präsentieren und besprechen ihre Ergebnisse im Anschluss	Arbeitsblätter FlipChart, Marker
5	Pause					
20	Konzentration & Aufmerksamkeitslenkung/ER	Übung + Reflexion	Plenum	äußere und innere Ablenker erkennen – sowohl situative als auch emotionale; Möglichkeiten des hilfreichen Umgangs mit Ablenkern kennen	Gruppe soll zusammen ein Bild malen, im Zentrum ein Männchen, drumherum alles, was ablenken könnte vom Lernen Nachbesprechung mit folgenden Schwerpunkten: Sammeln von Möglichkeiten des Umgangs mit inneren und äußeren Störungen Gedanken, die negative Emotionen auslösen als Ablenker Relevanz von ER, insbesondere wenn die Situation nicht geändert werden kann; Fokus Aufmerksamkeitslenkung	FlipChart, Marker; ppt
20	ER: Reaktionsmodulation	Übung + Reflexion	Plenum	Einblick in PMR und deren Wirkung erhalten	Kurzer Input zu Komponenten der emotionalen Reaktion (Erleben, körperliche/physiologische Reaktion, Verhalten) Progressive Muskelrelaxation (PMR) Reflexion: Wie fühlt Ihr Euch jetzt? Könntet Ihr Euch vorstellen, dass so etwas helfen kann? Info zu Notfallstrategien + diese als Hausaufgabe geben	PMR-Anleitung; Arbeitsblatt ‚Notfallstrategien'
5	Blitzlicht, Verabschiedung	Info	Plenum			Handout
90						

Sequenzplan Kombitraining 3

Zeit	Thema	Art	Sozialform / Methode	Ziel	Inhalt	Material
5	Begrüßung und Rückblick				Wiederholung der letzten Stunde	
15	Motivation	Übung + Reflexion	Kleingruppe + Plenum	Aktivieren und Ergänzen von Kenntnissen zu Motivationsstrategien	Wie motiviert Ihr Euch zum und während dem Lernen? Kennt Ihr schon Strategien? Ergebnisse der Kleingruppenarbeit werden von Trainer gesammelt und ergänzt Reflexion/Nachbesprechung: Intrinsische, extrinsische Motivation Selbstmotivation – direkt und indirekt; Motivation und Emotion gehören zusammen, Motivationsstrategien helfen auch bei negativen Emotionen Selbstmotivationsstrategien am Ende als Arbeitsblatt austeilen, Schüler sollen als Hausaufgabe diese Anwenden + kurze Info zu motivierender Ursachenzuschreibung / Bezugsnorm	FlipChart, Marker; Arbeitsblatt ‚Selbstmotivationsstrategien‘
15	ER: kognitive Veränderung	Übung + Reflexion	Einzel	Möglichkeiten der Umbewertung kennen und üben; Überblick zu Möglichkeiten der kognitiven Veränderung erhalten	Anhand vorgegebener Gedanken, übt jeder Schüler, Gedanken so umformulieren, dass statt negativer Gefühle, neutrale oder sogar positive Gedanken ausgelöst werden (Reframing) Reflektierende Nachbesprechung im Plenum + Info zu Möglichkeiten der kognitiven Veränderung (Abstand, Umbewerten, Positive Selbstgespräche)	Arbeitsblatt ‚Gedanken verändern‘
5	Pause					
30	SRL- und ER-Strategien in einer Lernsituation	Übung + Reflexion	Kleingruppe + Plenum	Integration der gelernten Inhalt und Transfer auf Situationen	Anhand verschiedener Situationsvignetten (nicht erfolgreich verlaufener Lernsituation; je eine Vignette pro Gruppe) reflektiert jede Kleingruppe: - Identifizieren von lernbezogenen Schwierigkeiten, Gedanken, Gefühlen der Person in der Situation - Entwicklung geeigneter SRL- sowie ER-Strategien aus allen behandelten Bereichen Kleingruppen stellen Ergebnisse in der Großgruppe vor; anschließend Diskussion im Plenum.	Situationsvignetten, FlipChart, Stifte
5	Zusammenfassung		Plenum		Rückblick auf die Sitzung	Handout
10	Planung Strategieanwendung	Reflexion	Plenum	Vorsätze bilden, bestimmte ER-Strategien in Zukunft häufiger anzuwenden	Koffer packen: Was nehme ich aus dem Training mit?	
5	Abschluss u. Verabschiedung		Plenum			
90						

10.1.3. Control Training Program: Sessions 1-3

Sequenzplan Kontrollgruppentraining 1

Zeit	Thema	Art	Sozialform / Methode	Ziel	Inhalt	Material
25	Begrüßung, Einstieg		Vortrag, Plenum		- Vorstellen der Trainer und Teilnehmer (Kennenlernübung) →Obwohl sich Schüler gegenseitig kennen vorstellen, Trainer stellen sich auf gleiche Art und Weise vor, um sich in Gruppe zu integrieren - Anfertigen von Namensschildern - Ablauf der 3 Sitzungen - Ablauf der 1. Sitzung	Ppt, Flipchart, Kärtchen, Kreppband
10	Lerntypen	Info / Reflexion	Interaktiver Vortrag	Lerntypen kennen und eigene Präferenzen reflektieren	Einstieg: Vier Lerntypen - Welche Lerntypen kennt ihr? - Was denkt ihr, was diese Lerntypen ausmacht? - Vorstellen der Lerntypen - Welchem Lerntyp würdet ihr euch zuordnen?/ Kommt euch davon was bekannt vor?	Ppt
10	Lernprozess	Info / Reflexion	Interaktiver Vortrag	eine Vorstellung vom Lernprozess entwickeln	Grundlegendes zum Thema Lernen: Der Lernprozess	Ppt, Flipchart, Stifte
5	PAUSE					
10	Kognitive Lernstrategien; Organisationsstrategien	Info	Vortrag	Überblick über kognitive Lernstrategien erhalten; die verschiedenen Organisationsstrategien und deren Nutzen kennen	Überblick Kognitive Lernstrategien → Organisationsstrategien und deren Nutzen: Kennzeichnung wichtiger Textstellen; Begriffe definieren; Sinnvolle Gliederung; Zusammenfassung; Visualisierung	Ppt
25	Organisations-strategien	Übung + Reflexion	Gruppenarbeit + Plenum	Teilnehmer wenden Organisationsstrategie (Mind-Map) an, indem sie von dem Training ein Mindmap erstellen	Übung: Erstellen einer Mind-Map zu den bisherigen Trainingsinhalten Vorstellen einer möglichen Musterlösung und Reflexion im Plenum	Flipchart-Papier und Stifte, ppt
5	Feedback & Abschluss					
90						

Sequenzplan Kontrollgruppentraining 2

Zeit	Thema	Art	Sozialform / Methode	Ziel	Inhalt	Material
5	Begrüßung	Info	Plenum	Überblick über die Sitzung gewinnen	Begrüßung Ablauf der 2. Sitzung	Ppt, evtl. Flipchart
10	Rückblick	Übung/ Reflexion	Plenum	Reaktivierung der Inhalte der letzten Sitzung	Kurze Wiederholung der letzten Sitzung mittels Quizfragen	Ppt
5	Elaborationsstrategien	Info	Plenum	Elaborationsstrategien kennenlernen	Überblick über Elaborationsstrategien: → Strategie 'Bildung von Analogien' wird näher erläutert	Ppt
5	Elaborationsstrategien	Übung	Plenum	Strategie ‚Bildung von Analogien' üben	Anhand vorgegebener Beispiele üben die Schüler das Bilden von Analogien	Ppt
5	Elaborationsstrategien	Info	Plenum	Elaborationsstrategien kennenlernen	Vorstellung der weiteren Elaborationsstrategien: Verknüpfung mit verwandten Fächern, Ausdenken konkreter Beispiele zu praktischen Anwendungsmöglichkeiten, Notizen machen, Vorstellungsbilder generieren, Mnemotechniken anwenden, Fragen stellen	Ppt
10	Elaborationsstrategien	Übung + Reflexion	Partnerarbeit + Plenum	Strategie 'Notizen machen' üben	Die Schüler sehen einen kurzen Film zum Thema ‚Nahrungskette', zu dem sie sich Notizen machen. Diese vergleichen sie mit dem Partner und füllen gemeinsam das Arbeitsblatt aus. Anschließende Reflexion im Plenum	Arbeitsblatt ‚Notizen machen'
5	PAUSE					
5	Kritisches Prüfen	Info	Plenum	Kritisches Prüfen kennenlernen	Überblick über Aspekte des Kritisches Prüfens: - Prüfung der Schlüssigkeit von Argumentationsketten - Prüfen, ob die in einem Text dargestellten Theorien, Interpretationen oder Schlussfolgerungen ausreichend belegt und begründet sind - Nachdenken über Alternativen - Vergleich verschiedener theoretischer Konzeptionen oder Ansätze	Ppt
35	Kritisches Prüfen	Übung + Reflexion	Partnerarbeit + Plenum	Kritisches Prüfen üben	Schüler lesen einen Text über Elaborationsstrategien und schreiben dazu kritische Fragen auf. Anhand der selbst generierten Fragen fragen sich die Partner anschließen gegenseitig zu den Inhalten des Textes ab.	Handout Notizzettel für Fragen
5	Feedback & Abschluss					
90						

Sequenzplan Kontrollgruppentraining 3

Zeit	Thema	Art	Sozialform / Methode	Ziel	Inhalt	Material
5	Begrüßung	Info	Plenum	Überblick über Ablauf der 3. Sitzung gewinnen	Begrüßung, Ablauf der 3. Sitzung	Ppt, evtl. Flipchart
10	Rückblick	Übung/ Reflexion	Plenum	Reaktivierung der Inhalte der letzten beiden Sitzungen	Organisationsstrategien, Elaborationsstrategien und Kritisches Prüfen als Oberbegriffe → Schüler müssen Unterbegriffe zuordnen → Trainer haken an passenden Stellen nach, fragen nach Beispielen und lassen erklären	Metaplankarten, Pinnwand, Pinnnadeln
10	Wiederholungs-strategien	Info	Plenum	Wiederholungsstrategien kennenlernen	Wiederholungsstrategien: - Mehrfaches Durcharbeiten von Lernstoff, eigenen Aufzeichnungen, etc. - Schlüsselbegriffe auswendig lernen - Text durchlesen und anschließend auswendig vorsagen - Verteiltes Lernen Mit Fragen an das Plenum; Schwerpunkt: Verteiltes Lernen	Ppt
15	Wiederholungs-strategien	Übung + Reflexion	Plenum	Anhand von Experimenten Veranschaulichung der Merkfähigkeit und der	Schüler betrachten ein Bild für einen begrenzten Zeitraum und versuchen, sich so viele Details wie möglich zu merken. Trainer stellen Fragen zu Details des Bildes. Im Anschluss sollen die Schüler sich Zahlenreihen merken und reproduzieren. Reflexion: - Begrenztheit der Merkfähigkeit wird deutlich; Reduzieren von Inhalten notwendig - Bildung von Chunks - Funktionsweisen des Arbeits- und Langzeitgedächtnisses - Transfer auf Lernsituationen	Ppt, evtl. Zettel
5	PAUSE					
5	Wissensnutzungsstrategien	Info	Plenum?	Wissensnutzungsstrategien kennenlernen	Wissensnutzungsstrategien: - Schreiben von Texten - Lösen von Problemen - Argumentieren/ diskutieren im sozialen Kontext	Ppt
20	Strategieanwendung	Übung + Reflexion	Einzel + Plenum	Eine Strategie der Wahl anhand von eigenem Lernmaterial üben	Schüler sollen in Übung eigene Lernunterlagen mit der Lernstrategie ihrer Wahl ausprobieren Anschließende Reflexion im Plenum	Ppt, Ausweich-Lernmaterial
10	Ergänzende Lerntipps	Info	Plenum	Weiteres Hintergrundwissen erhalten	Multimodales Lernen, Finden von individuell passenden Strategien, Pausen beim Lernen Beachtung des individuellen Biorhythmus, Lernen vor dem Schlafengehen	Ppt
10	Feedback & Abschluss					
90						

10.2. Appendix C2: Knowledge Test (German)

Prätestinstruktion: Mit den folgenden Fragen möchten wir herausfinden, ob du schon Vorwissen zu den Workshop-Themen hast. Wenn du zu den Fragen nicht die richtigen Antworten weißt, ist das also völlig normal. Bitte lies dir die Fragen aufmerksam durch, und versuche sie so gut wie möglich zu beantworten. Du hast 10 min Zeit.

Posttestinstruktion: Mit den folgenden Fragen möchten wir herausfinden, ob du jetzt nach dem Workshop mehr weißt als vorher. In jeder Gruppe gab es unterschiedliche Schwerpunkte, deshalb wirst du nicht alle Fragen beantworten können. Das ist ganz normal, du brauchst dich deshalb nicht zu sorgen. Im weiterführenden Online-Training kannst du dann die Themen lernen, die im Workshop noch nicht drankamen. Bitte lies dir die Fragen aufmerksam durch, und versuche sie so gut wie möglich zu beantworten. Du hast 10 min Zeit.

Es ist immer nur eine Antwort richtig. Bitte kreuze die richtige Antwort an.

1. Was sollte man gemäß dem Lernprozessmodell vor allem in der Phase vor dem Lernen tun?
☐ a) sich belohnen
☐ b) sich entspannen
☐ c) sich konzentrieren
☐ d) sich Ziele setzen

2. Zu welcher Lernstrategie zählt die Lernaktivität „Visualisieren“?
☐ a) Organisationsstrategie
☐ b) Elaborationsstrategie
☐ c) Wissensnutzungsstrategie
☐ d) Kritisches Prüfen

3. Was sind Auslöser von Emotionen?
☐ a) Gedanken
☐ b) Ereignisse
☐ c) Ereignisse und Gedanken
☐ d) keins von beidem

4. Wofür steht eine SMARTe Zielsetzung?
☐ a) Schnell, Machbar, Akribisch, Richtig, Täglich
☐ b) Spezifisch, Messbar, Anspruchsvoll, Realistisch, Terminiert
☐ c) Sinn erkennen, Modellieren, Aufschreiben, Richtigkeit prüfen, Tag festlegen
☐ d) Schriftlich, Mittelschwer, Aufgabenbezogen, Roter Faden, Teamarbeit

5. Wie viele verschiedene Lerntypen können unterschieden werden?
☐ a) Drei
☐ b) Zwei
☐ c) Vier
☐ d) Fünf

6. Was gehört nicht zu den Lern- und Leistungsemotionen?

☐ a) Hoffnung
☐ b) Freude
☐ c) Hunger
☐ d) Langeweile

7. Was ist eine Maßnahme, um seine Zeit besser einteilen zu können?

☐ a) Lernzeiten verändern
☐ b) Zeitplan erstellen
☐ c) am Wochenende lernen
☐ d) nach der Schule lernen

8. Welche Lernaktivitäten lassen sich den Elaborationsstrategien zuordnen?

☐ a) Schlüsselbegriffe auswendig lernen, Wiederholtes Durcharbeiten eigener Aufzeichnungen
☐ b) Begriffe definieren, Kennzeichnung wichtiger Textstellen
☐ c) Vorstellungsbilder generieren, Fragen stellen
☐ d) Sinnvolle Gliederung, Zusammenfassung

9. Emotionen wirken sich im Lern- und Leistungskontext aus auf:

☐ a) Motivation, Lernstrategien
☐ b) Leistung, Motivation
☐ c) Leistung, Lernstrategien
☐ d) Motivation, Lernstrategien, Leistung

10. Welche Strategie gehört nicht zu den Selbstmotivierungsstrategien?

☐ a) sich Ziele setzen
☐ b) sich belohnen
☐ c) sich Mut zusprechen
☐ d) sich mit anderen vergleichen

11. Was versteht man unter Bildung von Analogien?

☐ a) Gedächtnistraining
☐ b) Fachübergreifende Beziehungen herstellen
☐ c) Bilder im Kopf haben
☐ d) Erklärung durch Vergleich

12. Wie entsteht eine Emotion?

☐ a) Situation → Aufmerksamkeit → Beurteilung → Reaktion
☐ b) Aufmerksamkeit → Situation → Beurteilung →Reaktion
☐ c) Aufmerksamkeit → Situation → Reaktion → Beurteilung
☐ d) Beurteilung →Aufmerksamkeit → Reaktion → Situation

13. Was ist die individuelle Bezugsnorm?

☐ a) eigene frühere Leistungen
☐ b) Leistung des eigenen Umfelds
☐ c) persönliche Wertvorstellungen
☐ d) Wertvorstellungen der Gesellschaft

14. Was ist das Ziel von Wissensnutzungsstrategien?

☐ a) den Lernprozess situations- und aufgabengerecht steuern können
☐ b) neue Informationen verstehen und dauerhaft behalten können
☐ c) Erlerntes in Anwendungs- und Transfersituationen abrufen können
☐ d) Wissen organisieren und strukturieren können

15. Was ist <u>keine</u> gute Strategie, um Emotionen zu regulieren?

☐ a) anders bewerten
☐ b) vermeiden daran zu denken
☐ c) mit Humor nehmen
☐ d) akzeptieren

16. Worin sollte man die Gründe für eigene Erfolge suchen, wenn man sich selbst optimal motivieren will?

☐ a) eigene Fähigkeiten
☐ b) äußere Umstände
☐ c) eigene Anstrengungen
☐ d) Zufall

17. Das Ziel von Wissensnutzungsstrategien wird durch eines der folgenden Beispiele nicht unterstützt. Durch welches?

☐ a) Zeitmanagement
☐ b) Argumentieren bzw. Diskutieren im sozialen Kontext
☐ c) Problemlösen
☐ d) Schreiben von Texten

18. Welche Emotionsregulationsstrategie greift ein, wenn die Emotion bereits entstanden ist?

☐ a) Aufmerksamkeit kontrollieren
☐ b) Gedanken kontrollieren
☐ c) Reaktion kontrollieren
☐ d) Situation kontrollieren

10.3. Appendix C3: Self-report Measures (German)

10.3.1. Emotion Regulation

Mit den folgenden Fragen wollen wir herausfinden, welche Strategien du benutzt, um negative Gefühle zu regulieren, die mit der Schule oder dem Lernen zu tun haben.

Versetze dich bitte in folgende Situation:

Du hast in einer Prüfung / einer Klausur eine schlechte Bewertung erhalten. Stell dir vor, wie du dich daraufhin fühlst… Bist du traurig? Ärgerst du dich? Bist du wütend? Über deinen Lehrer? Über dich selbst? Über die Klausur? Es gibt viele Gründe, sich über eine schlechte Note zu ärgern.

Ausgerechnet jetzt musst du dich aber schon wieder auf eine neue Aufgabe konzentrieren, z.B. ein Referat erstellen. Überlege dir, wie du nun mit deinem Ärger umgehst, damit du dich konzentrieren und die neue Aufgabe gut bewältigen kannst.

Kreuze dasjenige Feld an, das am ehesten auf dich zutrifft.

Wenn ich wegen eines schlechten Prüfungsergebnisses traurig bin oder mich darüber ärgere …	**(fast) nie**	**selten**	**oft**	**(fast) immer**
versuche ich die Situation zu verändern, die dieses Gefühl in mir auslöst.	☐	☐	☐	☐
behalte ich dieses Gefühl für mich und lasse mir nach außen hin nichts anmerken.	☐	☐	☐	☐
denke ich, dass das das Schlimmste ist, was einem passieren kann.	☐	☐	☐	☐
versuche ich, das Ganze von der positiven Seite zu sehen.	☐	☐	☐	☐
bemühe ich mich das zu verändern, was dieses Gefühl in mir auslöst.	☐	☐	☐	☐
bemühe ich mich, meine Gefühle nach außen zu verbergen.	☐	☐	☐	☐
frage ich jemand anderen, ob er/sie mir dabei hilft, das zu verändern, was dieses Gefühl in mir auslöst.	☐	☐	☐	☐
denke ich, dass ich die Situation akzeptieren muss.	☐	☐	☐	☐
sage ich mir, dass ich eigentlich auf mein Können vertrauen kann.	☐	☐	☐	☐
konzentriere ich mich auf etwas, das mir leichter fällt.	☐	☐	☐	☐
will es mir einfach nicht aus dem Kopf gehen.	☐	☐	☐	☐
tue ich etwas anderes als zu arbeiten.	☐	☐	☐	☐
überlege ich, welche Ursachen es hat, dass ich mich so fühle.	☐	☐	☐	☐
zeige ich offen, wie ich mich fühle.	☐	☐	☐	☐
versuche ich, nicht darüber nachzudenken.	☐	☐	☐	☐
rede ich mit jemandem über meine Gefühle.	☐	☐	☐	☐
ziehe ich mich zurück.	☐	☐	☐	☐
denke ich an Dinge, die mir ein positives Gefühl geben.	☐	☐	☐	☐
schiebe ich die Arbeit lange auf und fange erst damit an, wenn die Zeit wirklich drängt.	☐	☐	☐	☐

Wenn ich wegen eines schlechten Prüfungsergebnisses traurig bin oder mich darüber ärgere …	**(fast) nie**	**selten**	**oft**	**(fast) immer**
überlege ich, ob hinter diesem Gefühl vielleicht ein anderes Gefühl steckt, das mir nicht bewusst ist, und versuche es aufzudecken.	☐	☐	☐	☐
mache ich mir bewusst, dass es in meiner Hand liegt welche Gefühle ich habe, und wie intensiv ich sie erlebe.	☐	☐	☐	☐
versuche ich, Gedanken darüber zu verdrängen.	☐	☐	☐	☐
mache ich mir klar, dass dieses eine Prüfungsergebnis nicht so wichtig ist.	☐	☐	☐	☐
denke ich ständig darüber nach, wie ich mich deswegen fühle.	☐	☐	☐	☐
rede ich mit jemandem, der in einer ähnlichen Situation ist wie ich.	☐	☐	☐	☐
denke ich, ich bin unfähig.	☐	☐	☐	☐
will ich allein sein.	☐	☐	☐	☐
versuche ich, mich zu entspannen.	☐	☐	☐	☐
versuche ich, meine Situation distanziert zu betrachten.	☐	☐	☐	☐
tue ich so, als ginge es mir gut.	☐	☐	☐	☐
suche ich Verständnis bei anderen.	☐	☐	☐	☐
denke ich, ich werde auch in Zukunft weiterhin schlechte Noten bekommen.	☐	☐	☐	☐
kann ich sowieso nichts dagegen machen.	☐	☐	☐	☐
rede ich mit niemandem.	☐	☐	☐	☐
mache ich etwas, das mir Spaß macht.	☐	☐	☐	☐
denke ich darüber nach, was ich an der Situation verändern könnte, die dieses Gefühl in mir auslöst.	☐	☐	☐	☐
denke ich, ich werde in Zukunft wieder bessere Noten haben.	☐	☐	☐	☐
tue ich etwas, das ich gut kann, um mich besser zu fühlen.	☐	☐	☐	☐
überlege ich mir, dass ich Prüfungen nicht so wichtig nehmen sollte.	☐	☐	☐	☐
denke ich fortwährend daran, wie schrecklich das ist.	☐	☐	☐	☐
überlege ich mir, wie ich mit der Situation am besten umgehen soll.	☐	☐	☐	☐
denke ich, dass ich besser zurechtkomme als viele andere.	☐	☐	☐	☐

10.3.2. Self-regulated Learning

Hier geht es um deine Lerngewohnheiten:

Was denkst und machst du, BEVOR du mit dem Lernen beginnst?

	(fast) nie	selten	oft	(fast) immer
Ich setze mir für das Lernen Ziele (z.B. schwere Aufgaben zu schaffen).	☐	☐	☐	☐
Ich überlege, wann und wie lange ich lerne.	☐	☐	☐	☐
Vor dem Lernen plane ich meine Zeit.	☐	☐	☐	☐
Bei schweren Aufgaben mache ich mir vorher Gedanken über den Lösungsweg.	☐	☐	☐	☐
Umfangreiche Aufgaben teile ich in kleine Schritte.	☐	☐	☐	☐
Wenn ich keine Lust zum Lernen habe, sage ich mir: „Später mache ich etwas Schönes."	☐	☐	☐	☐
Ich überlege mir eine Belohnung für eine schwere Aufgabe (z.B. Süßigkeit).	☐	☐	☐	☐
Ich sage mir bei schweren Aufgaben: „Trau dich, du schaffst das schon!"	☐	☐	☐	☐
Schwere Aufgaben teile ich mir in kleine Portionen ein.	☐	☐	☐	☐
Ich mache meine Hausaufgaben immer zur selben Zeit.	☐	☐	☐	☐
Vor dem Lernen überlege ich mir ein Ziel (z.B. möglichst schnell zu sein).	☐	☐	☐	☐
Bevor ich lerne, überlege ich, wie ich am besten vorgehe.	☐	☐	☐	☐

Was denkst und machst du, WÄHREND du lernst?

	(fast) nie	selten	oft	(fast) immer
Wenn ich beim Lernen an etwas Anderes denke, dann sage ich meinen Gedanken: „Stopp!"	☐	☐	☐	☐
Ich sorge dafür, meine Aufgaben an einem ruhigen Ort zu machen.	☐	☐	☐	☐
Wenn ich mich nicht mehr konzentrieren kann, dann sage ich mir: „Das hältst du schon durch!"	☐	☐	☐	☐
Ich strenge mich beim Lernen richtig an.	☐	☐	☐	☐
Bei schweren Aufgaben überlege ich, ob ich alles richtig mache.	☐	☐	☐	☐
Ich bin bereit, mich richtig anzustrengen, um den Lernstoff zu schaffen.	☐	☐	☐	☐
Beim Lernen merke ich schnell, wenn ich mit meinen Gedanken wo anders bin.	☐	☐	☐	☐
Ich schreibe auf wie ich lerne, zum Beispiel mit einem Lerntagebuch.	☐	☐	☐	☐

Was denkst und machst du, NACHDEM du gelernt hast?

	(fast) nie	selten	oft	(fast) immer
Nach dem Lernen überlege ich, was ich das nächste Mal noch besser machen kann.	☐	☐	☐	☐
Ich schaue, ob es mit dem Lernen besser geklappt hat als beim letzten Mal.	☐	☐	☐	☐
Nach dem Lernen denke ich darüber nach, was ich gelernt habe und was ich noch nicht verstanden habe.	☐	☐	☐	☐

10.3.3. Self-control Capacity

Im Folgenden geht es um deine persönliche Einschätzung:

Bitte kreuze an, inwieweit folgende Aussagen deiner Meinung nach auf dich zutreffen:	**trifft zu**	**trifft eher zu**	**trifft eher nicht zu**	**trifft nicht zu**
Ich bin gut darin, Versuchungen zu widerstehen.	☐	☐	☐	☐
Ich bin faul.	☐	☐	☐	☐
Ich tue manchmal Dinge, die schlecht für mich sind, wenn sie mir Spaß machen.	☐	☐	☐	☐
Ich wünschte, ich hätte mehr Selbstdisziplin.	☐	☐	☐	☐
Angenehme Aktivitäten und Vergnügen hindern mich manchmal daran, meine Arbeit zu machen.	☐	☐	☐	☐
Ich kann effektiv auf langfristige Ziele hinarbeiten.	☐	☐	☐	☐
Manchmal kann ich mich selbst nicht daran hindern, etwas zu tun, obwohl ich weiß, dass es falsch ist.	☐	☐	☐	☐
Ich handle oft ohne alle Alternativen durchdacht zu haben.	☐	☐	☐	☐
Ich lehne Dinge ab, die schlecht für mich sind.	☐	☐	☐	☐
Andere würden sagen, dass ich eine eiserne Selbstdisziplin habe.	☐	☐	☐	☐

Eidesstattliche Erklärung

Hiermit versichere ich, dass ich die vorliegende Arbeit mit dem Titel
„*Emotion Regulation in Educational Contexts: The Role of Positive Strategies and Self-control*“
selbstständig, ohne Hilfe Dritter und nur mit den angegebenen Quellen und Hilfsmitteln angefertigt habe. Alle Stellen, die aus anderen Werken im Wortlaut oder dem Sinne nach entnommen wurden, sind als solche kenntlich gemacht.
Diese Arbeit hat in gleicher oder ähnlicher Form noch keiner Prüfungsbehörde
vorgelegen.

Darmstadt, den 24. August 2017

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